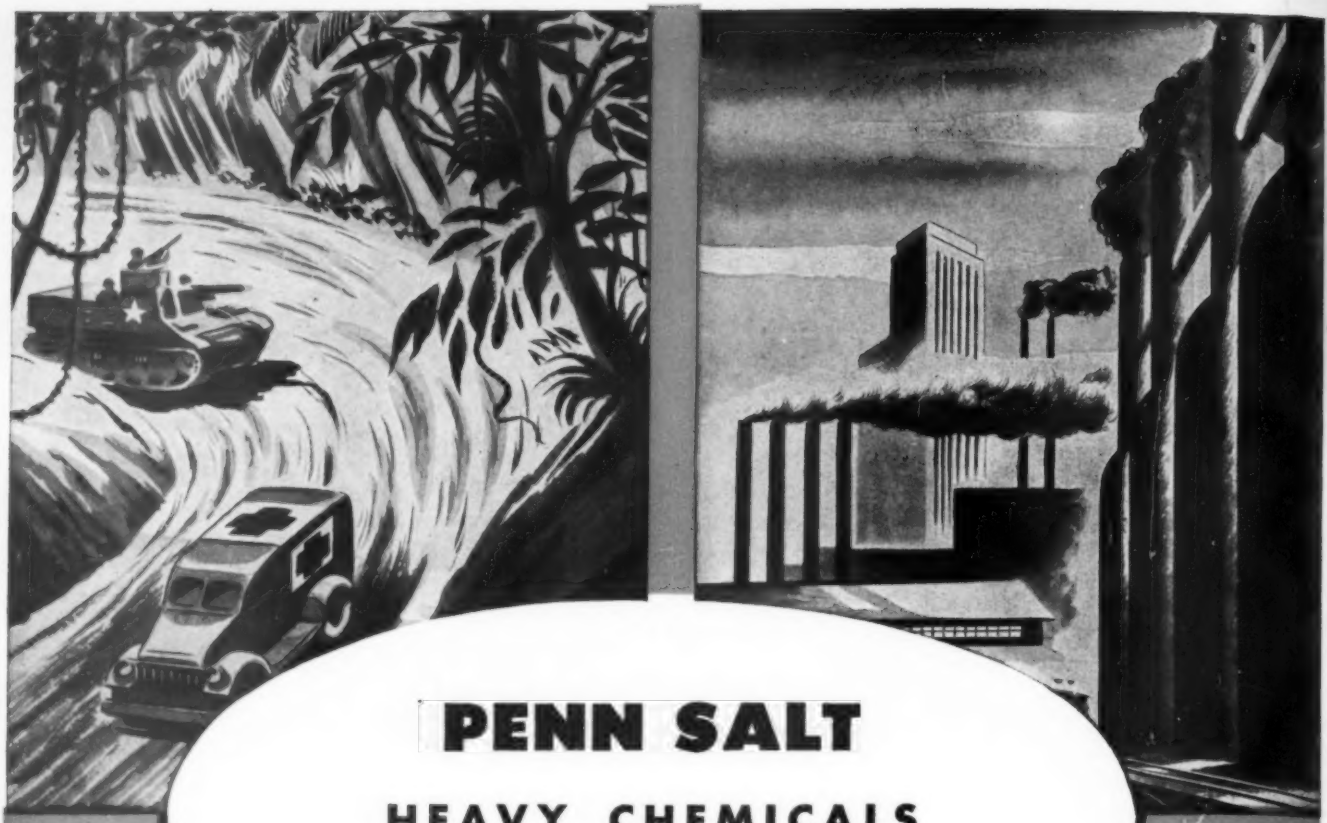
WATER WORKS & SEWERAGE

A. M. RAWN

SEWAGE WORKS MAN OF THE YEAR



PENN SALT

HEAVY CHEMICALS AT WAR

Penn Salt manufactures

Liquid Chlorine

for water sanitation and sewage treatment

Also

Perchloron* • Anhydrous Ammonia
Filter Alum • Ferric Chloride
Sodium Aluminate • Chloride of Lime
Caustic Soda and other products

*Trade-mark Reg. U. S. Pat. Off.

PENN SALT CHLORINE and PERCHLORON* are on duty at the battlefronts around the world—in the training camps—at every bridgehead . . . protecting our fighting men against the dangers of water-borne disease . . . serving the medical corps as bactericides . . . sanitizing clothes and supplies in camp laundries . . . guarding soldiers' feet against infection.

OTHER PENN SALT PRODUCTS are doing other vital wartime jobs in many fields. They are used in the manufacture of explosives—in the making of textiles for military supplies—as important new materials for gas mask canisters—in substantial amounts for the pulp and paper industry—and in even greater quantities for chemicals and soaps.

These needs for Penn Salt heavy chemicals may sometimes limit our supply for other purposes—but our wartime activities mean expanded production and greater service facilities, to serve you better when the war is won.

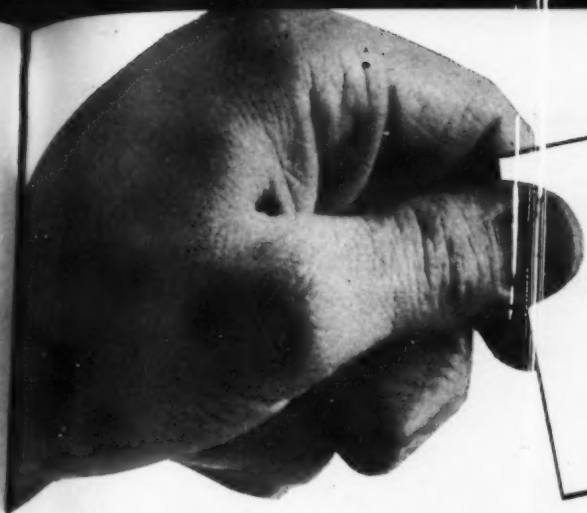
PENNSYLVANIA SALT MANUFACTURING COMPANY

Chemicals

1000 WIDENER BUILDING, PHILADELPHIA 7, PA.

NEW YORK • CHICAGO • ST. LOUIS • PITTSBURGH • MINNEAPOLIS • WYANDOTTE • TACOMA

WATER WORKS & SEWERAGE, February, 1944, Volume 91, Number 2. Published monthly by Gillette Publishing Co., 330 South Wells Street, Chicago, Ill. Per copy, 25c. Subscription rate, United States, $2.00 per year; Canada, $2.00 per year; Foreign, $3.00 per year. Entered as Second Class Matter, June 2, 1931, at the Post Office at Chicago, Ill., under act of March 3, 1879.



PITTSBURGH EQUITABLE METER COMPANY
MERCO NORDSTROM VALVE COMPANY

JOHN W. SMITH
SERVICE ENGINEER

LET'S ALL GIVE THIS MAN

a Great Big Hand

Traveling men are today probably operating under heavier handicaps than any other group. With gas rationing, crowded trains and busses (more frequently than not running on late schedules), and hotel accomodations virtually unobtainable in many centers, these "ambassadors of the brief case" deserve a world of credit for carrying on in the face of many obstacles. They neither ask for or receive any special favors, but plug away bringing to their customers about the only thing many have to sell today—service.

Of course, a great number of our products are necessary and vital to the successful pursuit of the war. Other lines have been discontinued entirely for the duration. Selling, as such, is virtually a thing of the past, but engineering and technical assistance, particularly in maintenance and installation work, is very important. We have retained our entire staff, which has been carefully built over the years, to bring those in the field the maximum knowledge and experience in measurement and control.

Some of our service engineers have been temporarily transferred to other jobs in our organization, such as, expediting, engineering and manufacturing, where special talents could be best utilized in producing war goods. They have willingly sacrificed their personal desires in the interests of their Country. When Victory is won, they will again be assigned to their territories to call on old friends whose contacts they sorely miss. These men are now having a hand in writing the future. They deserve a big hand from all who know or have worked with them.

PITTSBURGH EQUITABLE METER CO.

Atlanta **MERCO NORDSTROM VALVE CO.** Boston
Brooklyn Main Offices, PITTSBURGH, PA. Buffalo
Chicago Columbia Houston Kansas City
Los Angeles New York Pittsburgh
San Francisco Seattle Tulsa

National Meter Division, Brooklyn, N. Y.

PITTSBURGH-NATIONAL IRON CASE WATER METERS

EMPIRE VICTORY METERS Sizes 5/8" and 5/8" x 3/4"
IRONSIDE WATER METERS Sizes 5/8" through 2"
EMPIRE TYPE 9 METERS Sizes 3/4" and 1"
GEM WATER METERS Sizes 2" through 12"
EMPIRE LARGE CAPACITY METERS Sizes 1 1/2" through 6"
EMPIRE COMPOUND METERS Sizes 3" through 12"

LOUIS XIV OF FRANCE SELECTS ROUTE FOR WORLD'S FIRST CAST IRON WATER MAIN.

280 YEARS OF CONTINUOUS SERVICE IN EUROPE

THE first recorded installation of cast iron pipe to carry water was made in 1664 by order of the King of France. Unless recently destroyed by bombing, it is still in service. Throughout Europe 200-year-old cast iron water mains were in service before the United States and Royal Air Force bombers began their destructive raids—and still may be.

So when you specify cast iron pipe for current or postwar construction, you know one thing for certain—it will serve for centuries, in its original location or elsewhere. If the line has to be relocated or abandoned or replaced by larger diameters, you also know that cast iron pipe can be taken up and re-laid, or salvaged for cash. You may also know that cast iron pipe costs far less to maintain than any other pipe used for water mains, as proved by an unbiased survey.

[Section of world's oldest cast iron water main still (at last reports) supplying the town and parks of Versailles, France, after 280 years of continuous service.]

PRESIDENT MONROE SIGNING MESSAGE TO CONGRESS DECLARING THE MONROE DOCTRINE IN 1823.

123 YEARS OF CONTINUOUS SERVICE IN AMERICA

[Here is America's oldest cast iron water main, now in its 124th year of continuous service in the water distribution system of the city of Philadelphia.]

THE first cast iron water main installed in America was laid in 1821 in Philadelphia. It is still in service. Today, nearly a century-and-a-quarter later, the methods by which cast iron pipe is produced have undergone revolutionary changes. Metallurgical, laboratory and production controls have been developed. Extensive product and field research projects have been carried out by our Association, independently and in cooperation with Associations representing users of pipe. A recent and fundamental forward step is the new Law of Design for cast iron pipe in underground service, approved by the American Standards Association and sponsored by official organizations representing pipe users.

Thus, you can take it for granted that the cast iron pipe made today by our members, has not only *long life* as proved by generations of service the world over, but is more economical than ever.

Cast Iron Pipe Research Association
Thomas F. Wolfe, Engineer, Peoples Gas Building, Chicago, Ill.

Everdur GIVES "very good results" IN RESERVOIR EQUIPMENT

Our authority for this statement is the New Haven (Conn.) Water Company. Mr. F. J. Callahan, Superintendent, says further:

> ". . . we have had very good results with Everdur for the past several years and have standardized on it for gate house screens, screen guides, ladder rungs, valve stems in gate houses, bolts used under water and in fact any metal that is used under water."

Two types of Everdur* screen frames used by New Haven Water Company at main outlets in reservoirs.

Everdur is superior in such applications because it is rust-proof and corrosion-resistant . . . has high strength which permits the use of light weight construction. Furthermore, this copper-silicon alloy is made in practically all commercial forms . . . can be easily fabricated and welded . . . is moderate in cost. Additional information is contained in Publication E-11, copy on request.

KEEP BUYING WAR BONDS REGULARLY

*Reg. U. S. Pat. Off.

44139

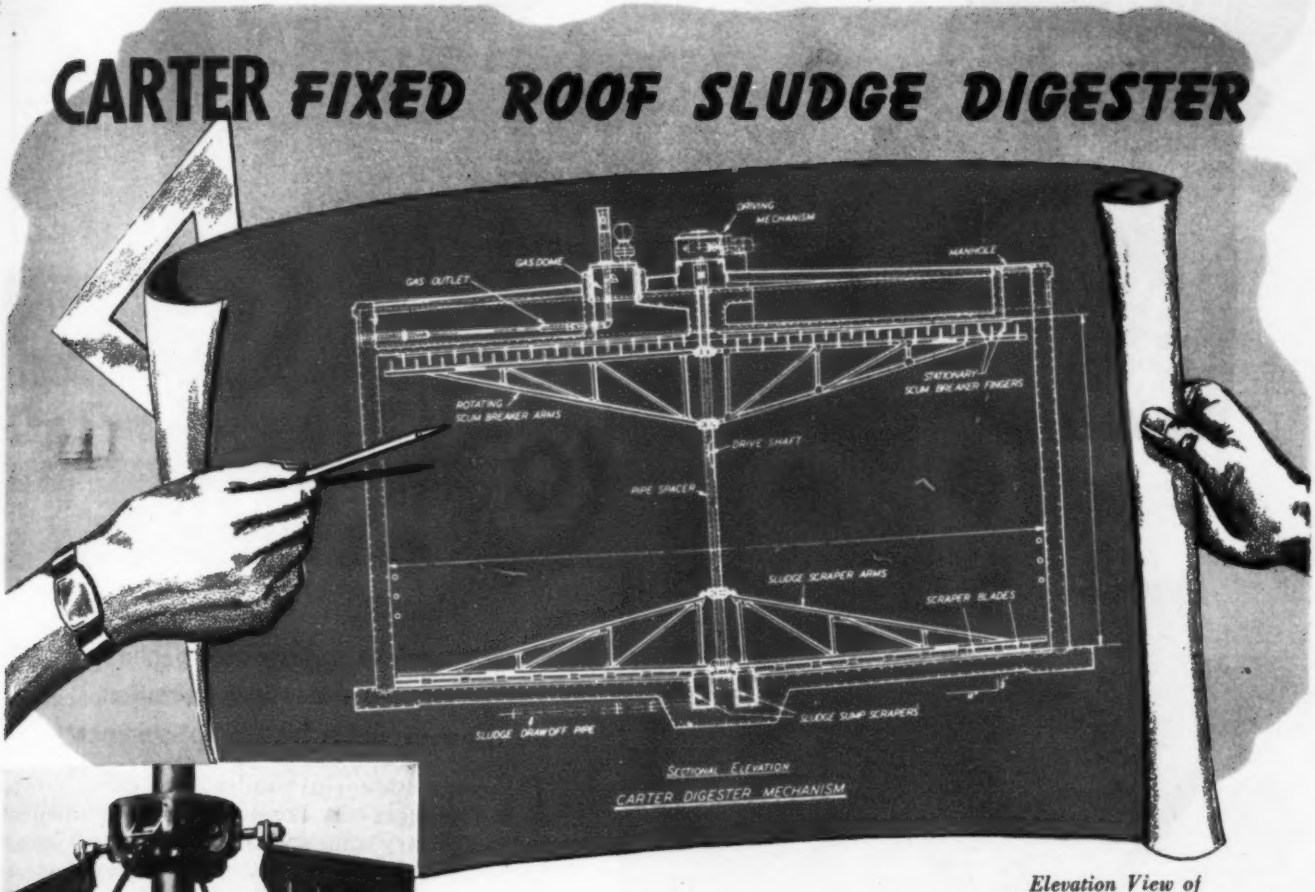
ANACONDA

Everdur Metal

THE AMERICAN BRASS COMPANY—General Offices: Waterbury 88, Conn.

Subsidiary of Anaconda Copper Mining Company—In Canada: Anaconda American Brass Ltd., *New Toronto, Ont.*

CARTER FIXED ROOF SLUDGE DIGESTER



Elevation View of Carter Fixed Roof Digester.

Fabrication of Sludge Scraper Mechanism

1 Positive Sludge Transfer with heavy duty plow blade truss fabricated from standard structural steel shapes.

2 Continuous Break Up of all Surface Scum Accumulations by Rotating Breaker Arms intermeshing with fixed arms attached to roof.

3 Adequate electrical and mechanical Overload Protection.

4 Efficient Gas Collection in electrically arc-welded, hot dipped galvanized, steel dome.

5 Drive Mechanism composed of Triple Type Reducer and Totally Enclosed Weatherproof Gear Motor, guaranteed to take shock loads equal to any emergency.

• The Carter Fixed Roof Digester, ruggedly constructed as illustrated, has been designed and proven as a unit, which will produce a thickened sludge of uniform consistency and low moisture content. The slow, positive stirring action of the mechanism will:

1. Facilitate mixing of green sludge with the treated material and speed the digestion process.
2. Remove grit and similar material regularly.
3. Prevent sludge accumulations in remote parts of tank.

FORTY-ONE YEARS OF CARTER EXPERIENCE, including pioneering of many sewage treatment units now in universal use, is reflected in the sound design and all-'round mechanical excellence of this Digester, promising long, trouble-free service and economical operation. • Further details are given in our Bulletin WS 4311 which will be mailed upon request.

CARTER SERVICE *includes design, fabrication and installation by our engineers . . . or under their supervision, if desired. Put your sewage treatment equipment problems up to us.*

CARTER

RALPH B. CARTER COMPANY

Main Office
HACKENSACK, N. J.

New York Office
53 Park Place, NEW YORK 7

IN EVERY STATE
J-M TRANSITE PIPE

...Saving upkeep, providing dependable, efficient water transportation. Now available for prompt shipment!

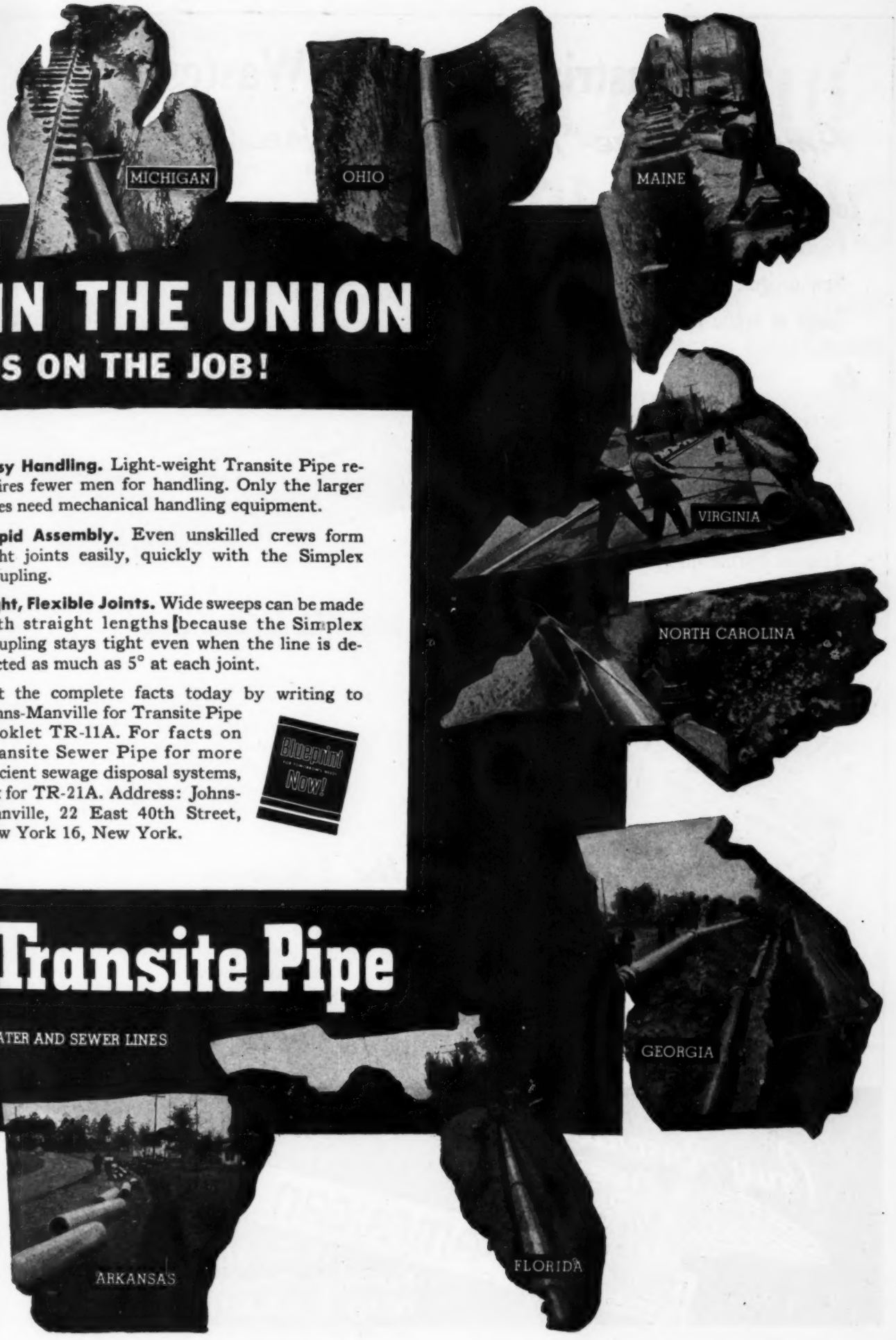
IN every state—in hundreds of cities, towns and villages—in dozens of both permanent and temporary military camps and bases, Johns-Manville Transite Pipe is providing efficient, dependable, low-cost water transportation. Now ready for prompt shipment, this modern, asbestos-cement pipe brings you these advantages:

Low Maintenance. Made of asbestos-cement, Transite's corrosion-resistance and maintained strength contribute to its low maintenance costs.

Tuberculation No Problem. Non-metallic in composition, Transite cannot tuberculate. Its initial high flow co-efficient (C=140) can never be reduced by tuberculation.

JOHNS-MANVILLE JM PRODUCTS

JOHNS-MANVILLE
Asbestos
FOR EFFICIENT, ECONOMICAL



IN THE UNION
IS ON THE JOB!

Easy Handling. Light-weight Transite Pipe requires fewer men for handling. Only the larger sizes need mechanical handling equipment.

Rapid Assembly. Even unskilled crews form tight joints easily, quickly with the Simplex Coupling.

Tight, Flexible Joints. Wide sweeps can be made with straight lengths because the Simplex Coupling stays tight even when the line is deflected as much as 5° at each joint.

Get the complete facts today by writing to Johns-Manville for Transite Pipe Booklet TR-11A. For facts on Transite Sewer Pipe for more efficient sewage disposal systems, ask for TR-21A. Address: Johns-Manville, 22 East 40th Street, New York 16, New York.

Transite Pipe

WATER AND SEWER LINES

Industrial-Municipal Wastes

American Pre-Treatment — Grease Flotation

for

Existing overloaded treatment plants.

New designs.

Tough or septic wastes.

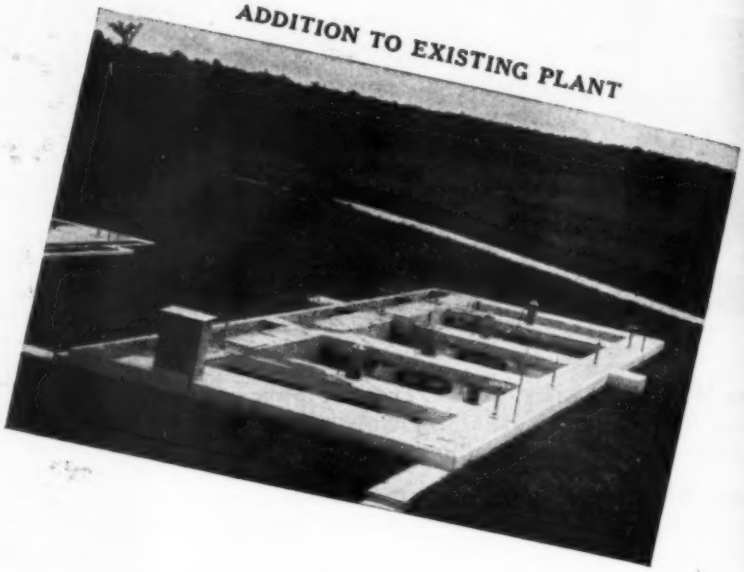
to

Increase b. o. d. and suspended solids removal.

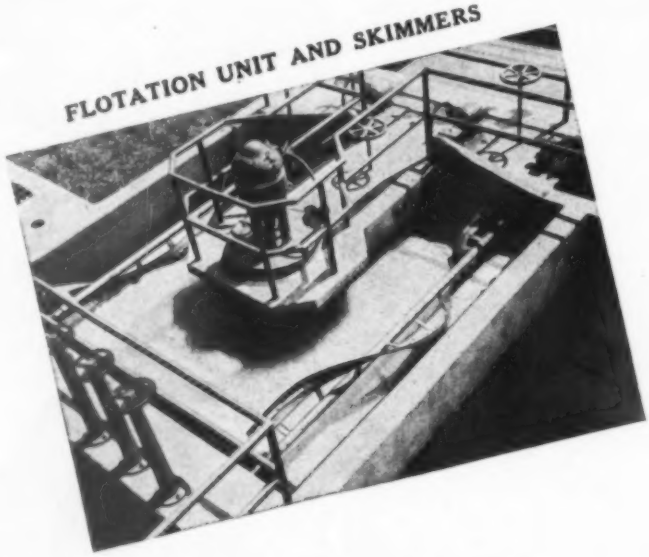
Establish aerobic conditions.

Oxidize and reduce odors.

Remove detrimental grease and scum.



ADDITION TO EXISTING PLANT



FLOTATION UNIT AND SKIMMERS

Send for Bulletin No. 260

the Flotation unit

Circulates the tank contents and entrains fine air bubbles in the waste.

Causes violent agitation at the lower reaches of the tank, maintaining a homogeneous dispersion of fine bubbles and liquor.

Permits a quiescent tank surface for the accumulation of grease and scum blanket.

the Skimmer

Removes grease and scum continuously.

Eliminates re-entrainment of grease into the liquor.

Minimizes amount of clear liquid to be handled.

Buy American

AMERICAN

ESTABLISHED 1868

THE AMERICAN WELL WORKS

AURORA ILLINOIS

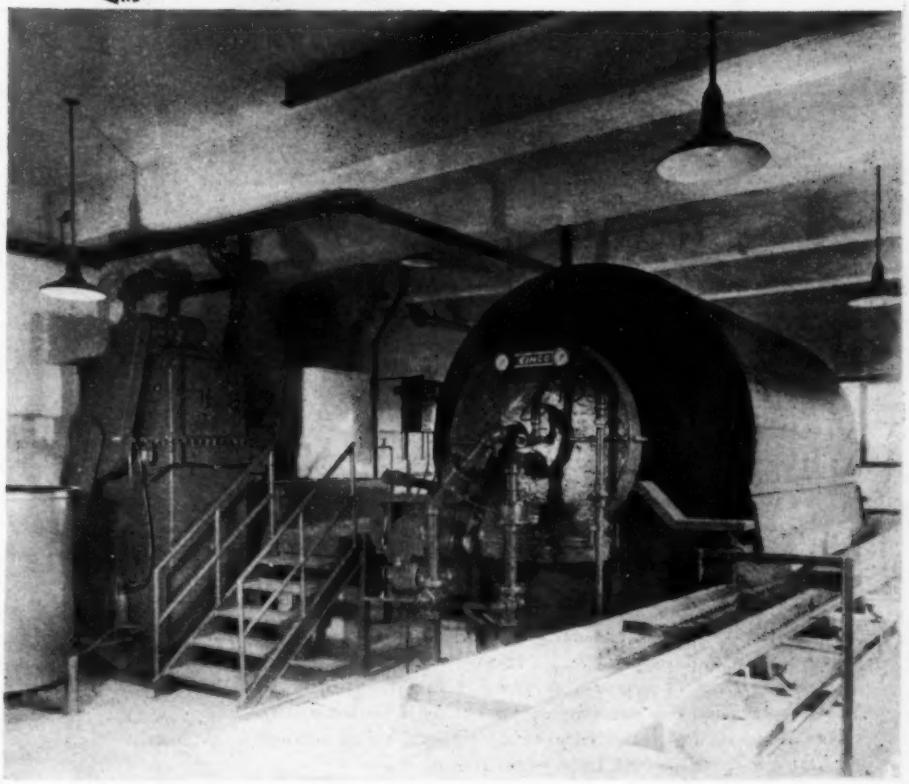
MANUFACTURERS OF

Pumping,—Sewage Treatment,—

and Water Purification Equipment

CAREFUL PLANNING

Assures Highly Efficient Sewage Disposal Installations



Eimco Sewage Installation. Continuous vacuum filter with 200 sq. ft. of filter area.

1. Superior workmanship and Heavy Duty Construction.
2. Complete Design and Engineering Service.
3. Eimco Assumes Responsbility of Complete Filter Installations.
4. Preliminary Estimates and Layouts available without obligation.
5. Backed by Nation Wide Experience.

Eimco Engineers, with years of experience in the manufacture of sewage disposal units, know the absolute necessity of planning carefully every minute detail of each installation.

A thorough investigation of local conditions enables Eimco Engineers to determine proper type and size of equipment best suited for each plant.

Continuous vacuum filters, and all accessories including sludge conditioning equipment, vacuum systems, elevators and mix tanks are designed and built to take up a minimum of floor space and to complete a compact efficient and attractive filter station.

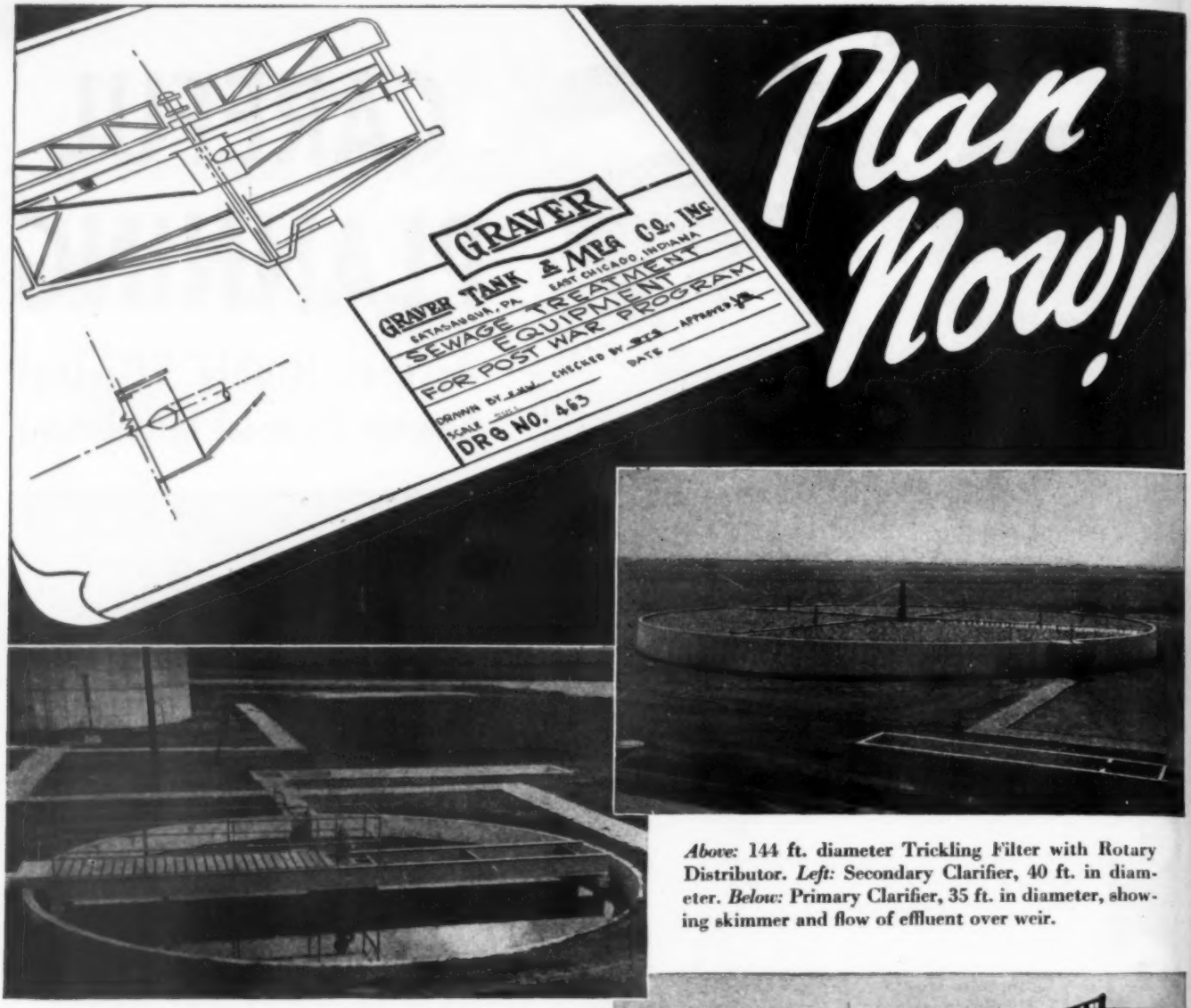
Eimco Engineers welcome an opportunity to aid in planning post-war sewage treatment plants. Why not call on them for assistance now.

EIMCO

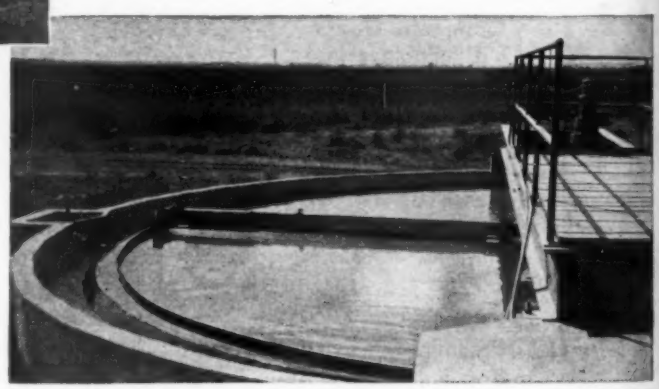
THE EIMCO CORPORATION, SALT LAKE CITY 8, UTAH

NEW YORK, 120 Broadway — SACRAMENTO, 1212 7th St.

CHICAGO, 111 W. Washington St. — EL PASO, [illegible]



Above: 144 ft. diameter Trickling Filter with Rotary Distributor. *Left:* Secondary Clarifier, 40 ft. in diameter. *Below:* Primary Clarifier, 35 ft. in diameter, showing skimmer and flow of effluent over weir.



Now is the time for action . . . the time to get your plans and ideas on paper . . . to start the engineering and designing. Then . . . when that great day of Victory arrives, the preliminary work will be done, and there need be no delay in getting your needed sewage treatment equipment into production.

The efficiency, low operating cost, and trouble-free service of Graver Sewage Treatment Equipment is once again demonstrated in this complete plant recently installed at a large Army Cantonment. It was designed in cooperation with U. S. Government engineers and built by Graver. The Rotary Distributor has multiple flows and takes 4 to 1 flow variations with equal distribution.

In making your plans for postwar developments, consult Graver. Our engineers will gladly discuss your problems with you and submit estimates without obligation.

GRAVER
SEWAGE TREATMENT EQUIPMENT

Process Equipment Division of

GRAVER TANK & MFG. CO., INC.

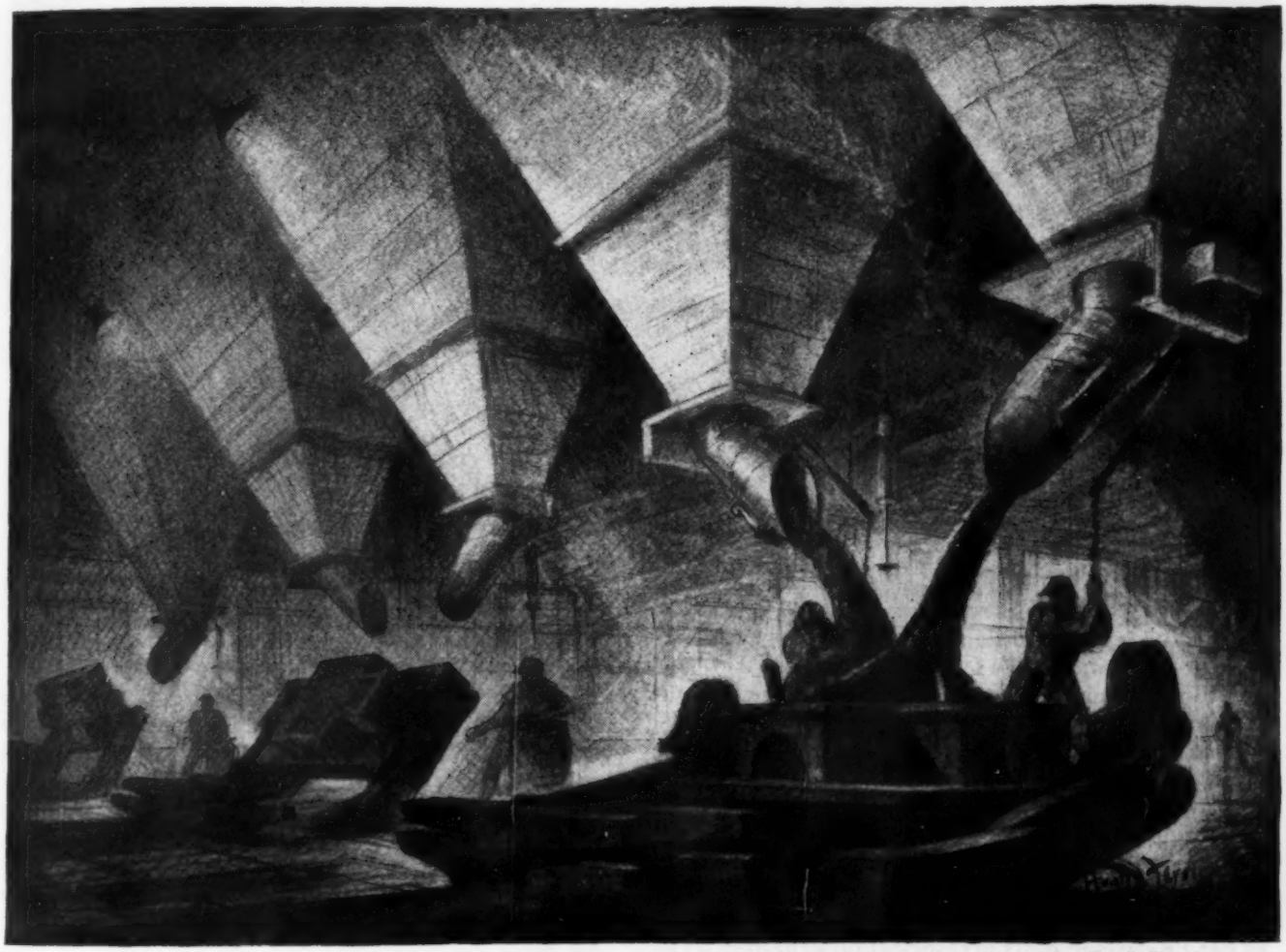
4809-43 Tod Ave., East Chicago, Ind.

NEW YORK · CATASAUQUA, PA. · CHICAGO · TULSA

Clarifiers, Primary and Secondary — Coagulators — Digesters — Gas Holders — Reactivator Clarifiers — Rotary Distributors — Skimmers — Sludge Conditioners, Dryers, and Filters.

For greater uniformity

The illustration below shows one step in our mechanized method of making cast iron fittings. The sand pouring into the flask has been mechanically mixed and laboratory tested. The flask with pattern in place is firmly fixed to the jar-rammer which mechanically rams the mold to a controlled, and the desired, density and contour. We believe that the mechanization of processes, wherever possible, in the manufacture of our products makes for greater uniformity. Quality control in the manufacture of U. S. Cast Iron Pipe, Fittings and Special Castings is maintained by skilled laboratory technicians from raw materials to the finished product.



A battery of jar-rammers in our specialized fittings plant, drawn by Hugh Ferriss

UNITED STATES PIPE & FOUNDRY CO.

General Offices: Burlington, New Jersey. *Plants and Sales Offices throughout the U. S. A.*

Reservoir of KNOWLEDGE *also needed*

Waterworks engineers and chemists need two kinds of reservoirs. The first, of course, is a man-made lake from which they serve their city with water. The second, no less important, is a reservoir of knowledge which makes their service to the community even more effective.

Chemical knowledge based on specific experience is an essential for technical men who supervise chlorination processes. It is available today. As a result, research into new methods has been translated into improvements in taste and odor control, as well as in filter operation.

HOOKER KNOWS CHLORINE

HOOKER developments in chlorination stem from a 35-year experience with chlorine. Liquid Chlorine, manufactured under HOOKER specifications, has proved itself reliable not only for odor control and water purification but also for slime control and sewage treatment.

Remember these same high standards apply to other HOOKER chlorine products such as Bleaching Powder and Ferric Chloride solution. Please feel free to take advantage of the advice our technical men can give you. We will be glad to furnish information about any specific product, or give counsel about any specific problem in which you think we can help. If you desire a list of our principal products with formulas, specifications, uses and container data, ask for Bulletin W2.

HOOKER ELECTROCHEMICAL COMPANY

NIAGARA FALLS, N. Y.

New York, N. Y. • Tacoma, Wash. • Wilmington, Calif.

HOOKER CHEMICALS

HOOKER ELECTRO CHEMICAL COMPANY

5083

In the tight spots it's a STAR

Example: CHICAGO PUMP CO. COMMINUTORS are equipped with **STAR MOTORIZED REDUCERS**

These Star-powered comminutors are used widely here and abroad to screen and cut sewage matter automatically.

They operate 24 hours a day, 365 days a year.

They're ruggedly built to absorb mechanical or weather shocks and to keep going.

It's a simple matter for STAR to fit mechanical "tight spots". STAR does it every day with its unique welded construction that eliminates special patterns and castings completely. And it's the same with the other "tight spots," too—the unusual problems that puzzle manufacturers daily. In the **CHICAGO PUMP CO.**'s Comminutors for Sewage Plants, for example, STAR engineering provides exposed motors and reducers that withstand the extremes of arctic ice or desert sand—and do it without special or costly construction.

Besides its complete line of standard motors, STAR provides *tailored* motors which combine the flexibility of specialized application and engineering with the obvious advantage of standardized design. Sizes—½ to 200 h. p. Write us about your requirements.

STAR ELECTRIC MOTOR CO., BLOOMFIELD, N. J.

POWER *PACKAGED* AS YOU NEED IT

ARMY E NAVY

STAR MOTORS

Blue print NOW for more efficient water or sewage treatment with Ferrisul

... Equipment, Material and Monsanto Technical Service All Available Now for Plant-Scale Tests!

There is no need to wait until after victory to plan for more efficient coagulation with Ferrisul, the only *anhydrous* ferric sulfate commercially available.

Monsanto's experienced technical service staff will be glad to start work on your particular problem now.

A few of the necessary mixing tanks and feeders are on hand and can be borrowed for plant-scale tests.

Ample quantities of Ferrisul are now available.

In recent years Ferrisul has thoroughly proved its many advantages as a coagulant in scores of water, sewage and waste treatment problems. Because its floc forms rapidly, settles quickly and is effective over the entire pH range above 3.5, it handles wide seasonal variations in raw water and even wider *daily* variations in sewage with maximum efficiency and a minimum change in treatment.

Dry and free flowing, Ferrisul is easy to store, handle and use. It may be transferred on any standard conveyor system and introduced into the treatment either by dry-feeding or in solution. It may be stored in steel or concrete bins and will not cake in storage. Little special equipment is necessary for proper applications.

Blueprint Now!

MONSANTO CHEMICALS
SERVING INDUSTRY...WHICH SERVES MANKIND

Write today for full details and experienced technical service on your particular problems: MONSANTO CHEMICAL COMPANY, Merrimac Division, Everett Station, Boston 49, Massachusetts.

Leading water works engineers are now preparing for peace with complete, detailed plans for new municipal supply lines. Judging from the blue-prints of the future, all indications point to a rapid residential and industrial growth of many cities and towns throughout the United States.

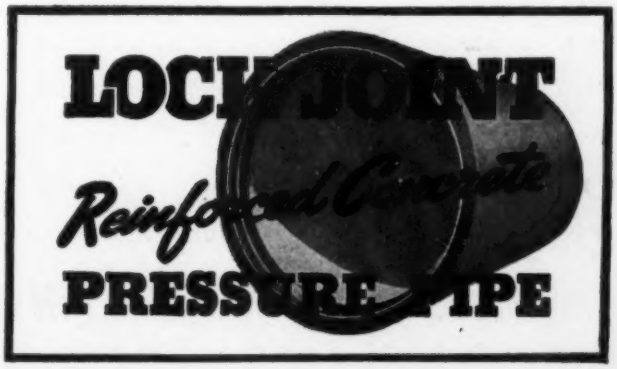
For many years Lock Joint Reinforced Concrete Pressure Pipe has been included in the specifications for the majority of all large diameter water pipe contracts and is playing an ever-increasing role in principal cities throughout the nation.

"Tailor-made" to fit the job, there is absolute assurance that strong, sturdy Lock Joint Pipelines are permanently immune to tuberculation and corrosion. City officials can depend upon permanent high carrying capacity and low cost operation for a century of useful service. Look to Lock Joint Reinforced Concrete Pressure Pipe as your most economical and safest post-war investment.

Whether your project is large or small, for the present or the future, your 'phone call, telegram, cable or letter to any of our offices will bring a prompt reply.

LOCK JOINT PIPE COMPANY
Established 1905
AMPERE, NEW JERSEY

Denver, Colo. • Chicago, Ill. • Kenilworth, N. J. • Kansas City, Mo. • Rock Island, Ill. • Joplin, Mo. • Valley Park, Mo. Cleveland, Ohio • Hartford, Conn. • Navarre, Ohio



SCOPE OF SERVICES *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply Mains as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous lines.*

Brother... what I could do with this "putt-putt" back home

Homelite Portable Generators are affectionately known in the Armed Forces as "putt-putts". Men who see and *use* them . . . around airports, or in bombers and tanks . . . have come to know them for their dependable performance under the toughest possible conditions. Those men can see right now how ready and able these new, handy "putt-putts" will be after the war . . . for operating floodlights, electric tools, radios, signal systems and many other devices.

There's no doubt about it, ex-service men will be among the best supporters of Homelite Portable Generators . . . for right now, these "putt-putts" are supporting them, wherever they are, in every possible way.

HOMELITE CORPORATION

PORT CHESTER, NEW YORK

Westward the Course

Westward from the Hudson and up through the fertile, rolling valleys of 'York State, came the Dutch and other traders in their great lumbering Conestoga wagons. They brought with them the necessities and luxuries sought by the settlers and the pioneers who were ever pushing the frontier westward. Even then, Niagara was a thriving center of activity, a link between the busy East and the growing West, a young and energetic locality ready for new trade, agricultural and industrial development.

As a pioneer chemical manufacturer in the Niagara area and the first to produce several important chemicals in America, Niagara Alkali Company is applying the full force of its pioneering experience and energy to supplying increasing quantities of essential products for which there is a growing demand to fill vital wartime needs. Thus is Niagara Alkali carrying on the pioneering traditions of its background.

CAUSTIC POTASH · CAUSTIC SODA · PARADICHLOROBENZENE
CARBONATE OF POTASH · LIQUID CHLORINE

An Essential Part Of America's Great Chemical Enterprise

ARMY E NAVY

Niagara ALKALI COMPANY

60 EAST 42nd STREET, NEW YORK 17, N. Y.

A Great Pair of Values!

DISPERSION AND SUSPENDABILITY IN ACTIVATED CARBON

Aqua Nuchar Activated Carbon offers to the water field the added value of greater suspendability and quicker dispersion.

These two methods of evaluation are rapidly growing in popularity because they are a means of measuring those physical characteristics of activated carbon which enable each individual particle to accomplish, more economically, the removal of taste and odor producing substances from raw water.

Activated Carbon particles which disperse readily throughout the water will greatly increase the immediate adsorption of impurities. However, if the carbon particles settle out in a relatively short time they cannot remove the remaining tastes and odors. Here is where the superior suspendability of Aqua Nuchar proves advantageous, because its carbon particles remain suspended in the water for a longer period of time and have a more prolonged opportunity to provide adequate control.

The extraordinary porosity of AQUA NUCHAR not only results in greater adsorption because of the larger surface area exposed but also accounts for its superior properties of dispersion and suspendability.

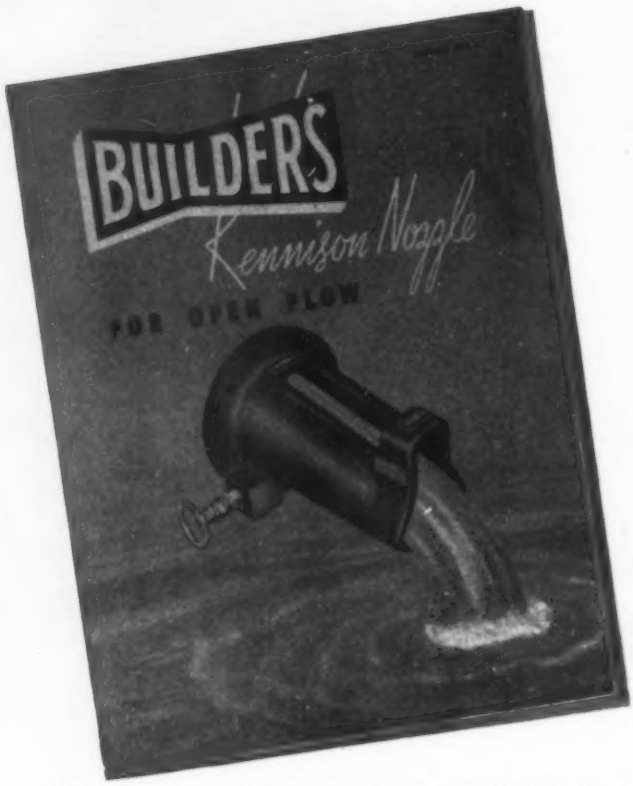
BLUEPRINT NOW!
But above all, remember there is a war yet to be won. Maintain equipment to assure operation at 100% efficiency.

NUCHAR

INDUSTRIAL CHEMICAL SALES

DIVISION WEST VIRGINIA PULP & PAPER COMPANY

230 PARK AVENUE, NEW YORK 17, N.Y. | 35 E. WACKER DRIVE, CHICAGO 1, ILLINOIS | 748 PUBLIC LEDGER BLDG., PHILADELPHIA 6, PA. | 844 LEADER BLDG., CLEVELAND 14, OHIO



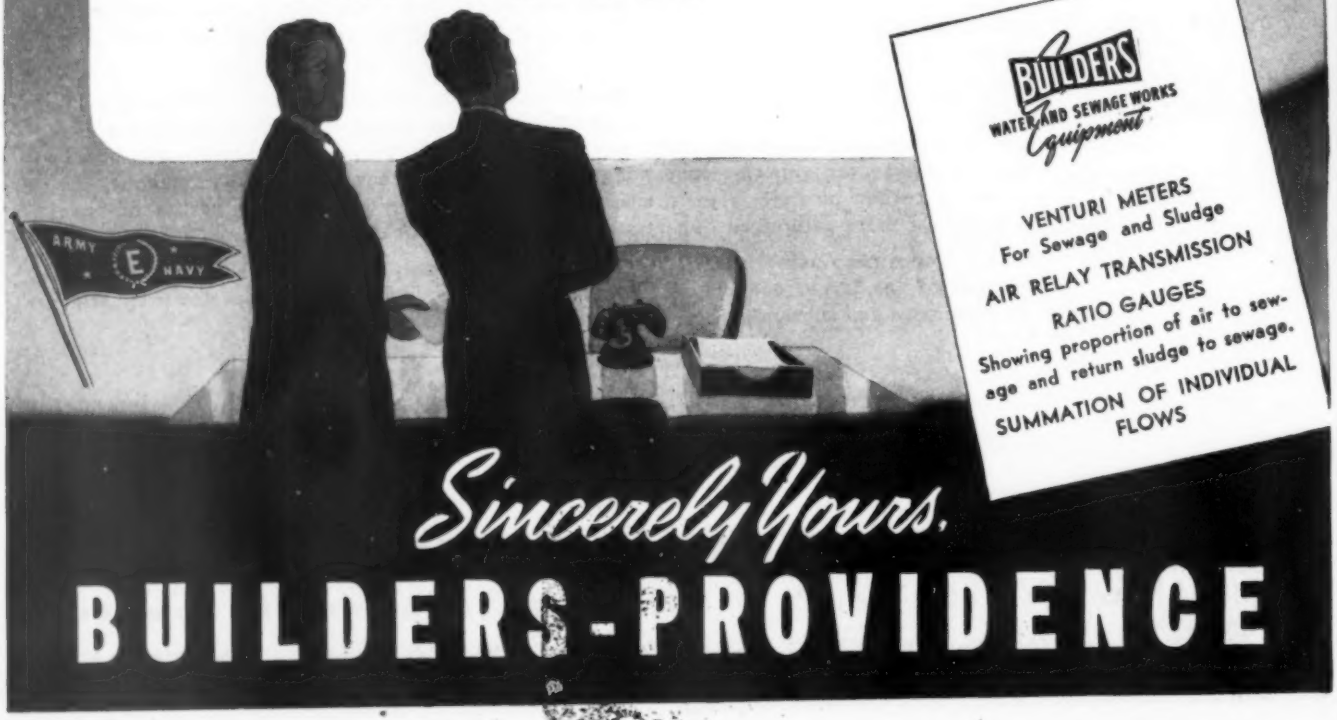
A FIGHT ON THE HOME FRONT

...AFTER THE WAR

After the war, the battle must immediately begin against **POLLUTION**, the insidious enemy threatening our national health and comfort. Streams, harbors, and shore lines must be cleaned up. It's time to be making plans and many communities have their engineers at work.

One of the first essentials will be the accurate measurement of sewage flow. Bulletin 334A illustrates and describes the Kennison Nozzle for measuring sewage flow in open channels or partially filled pipes. A postcard brings your copy. Address Builders-Providence, Inc. (Division of Builders Iron Foundry), 9 Codding St., Providence 1, R. I.

"BLUE PRINT NOW"



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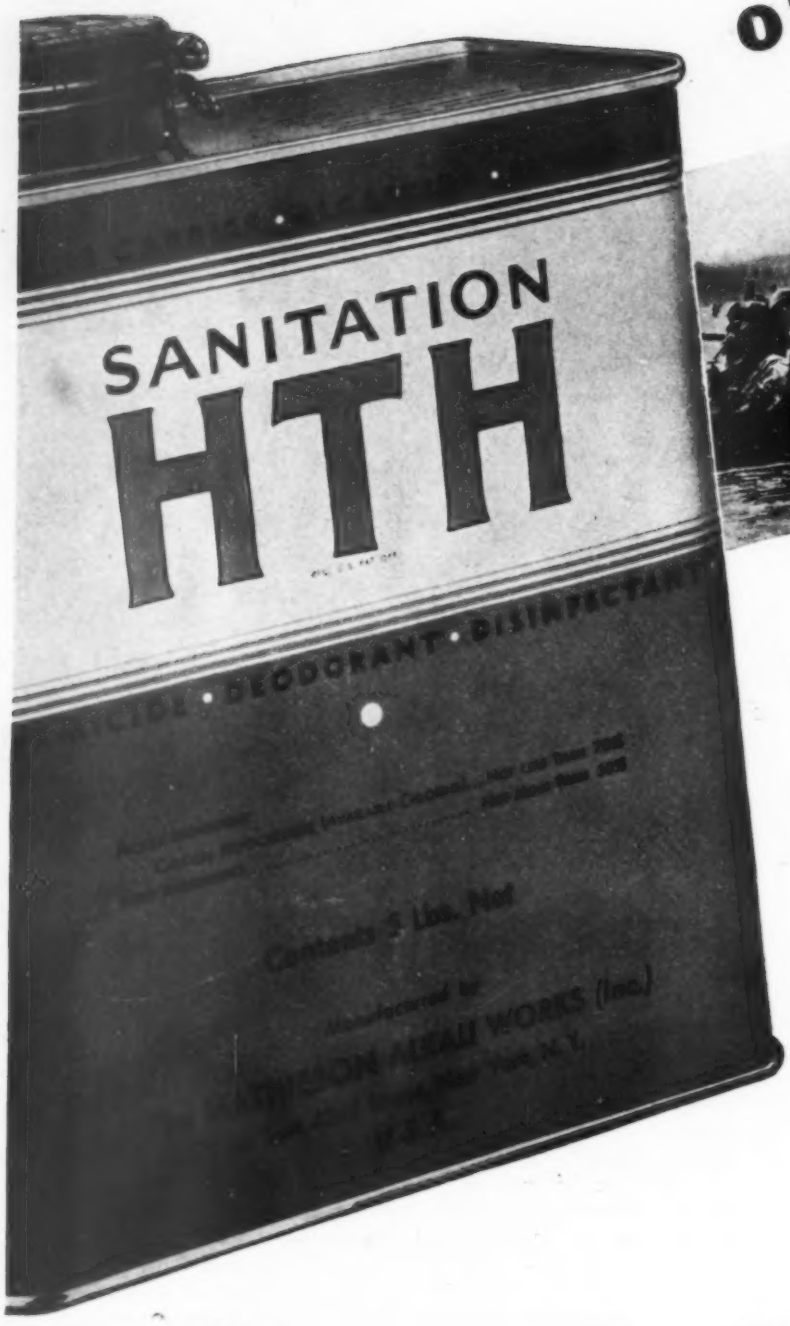

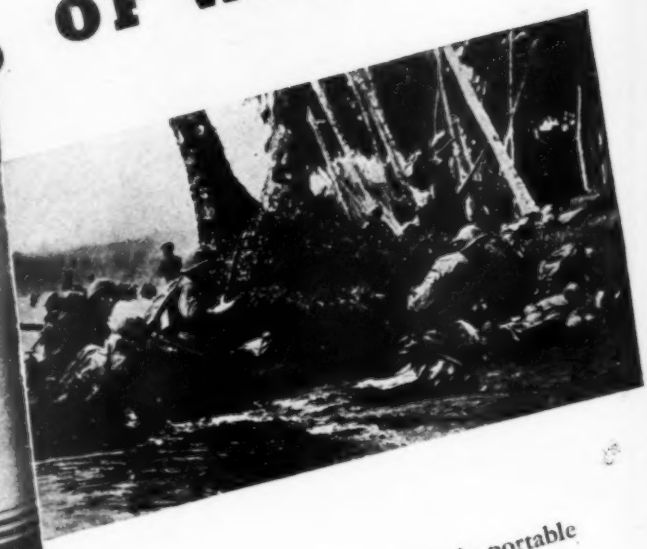

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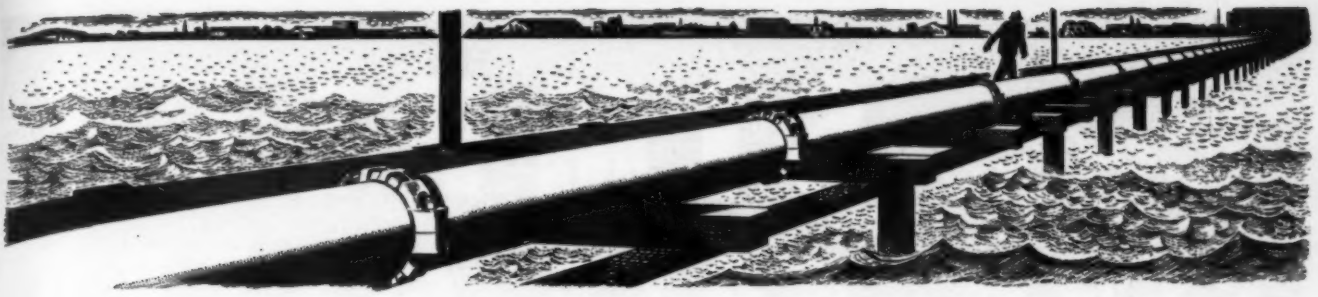

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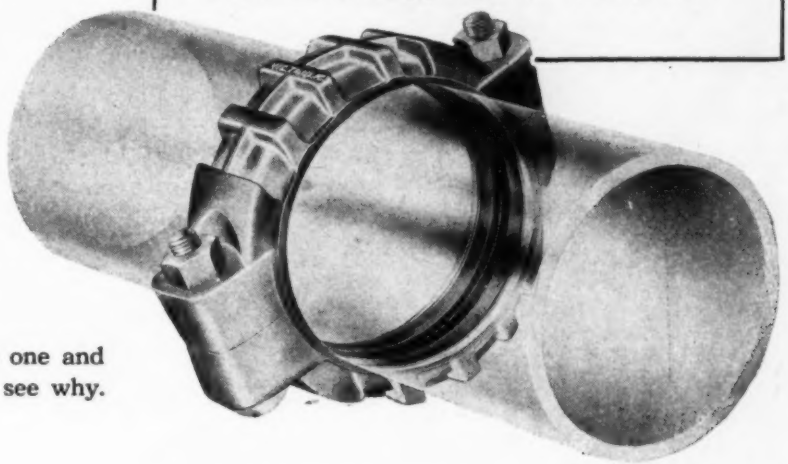

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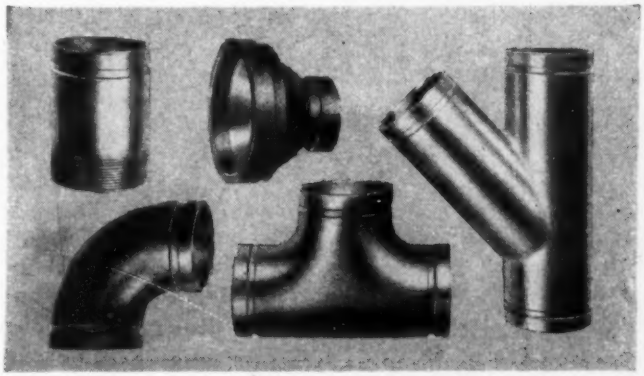

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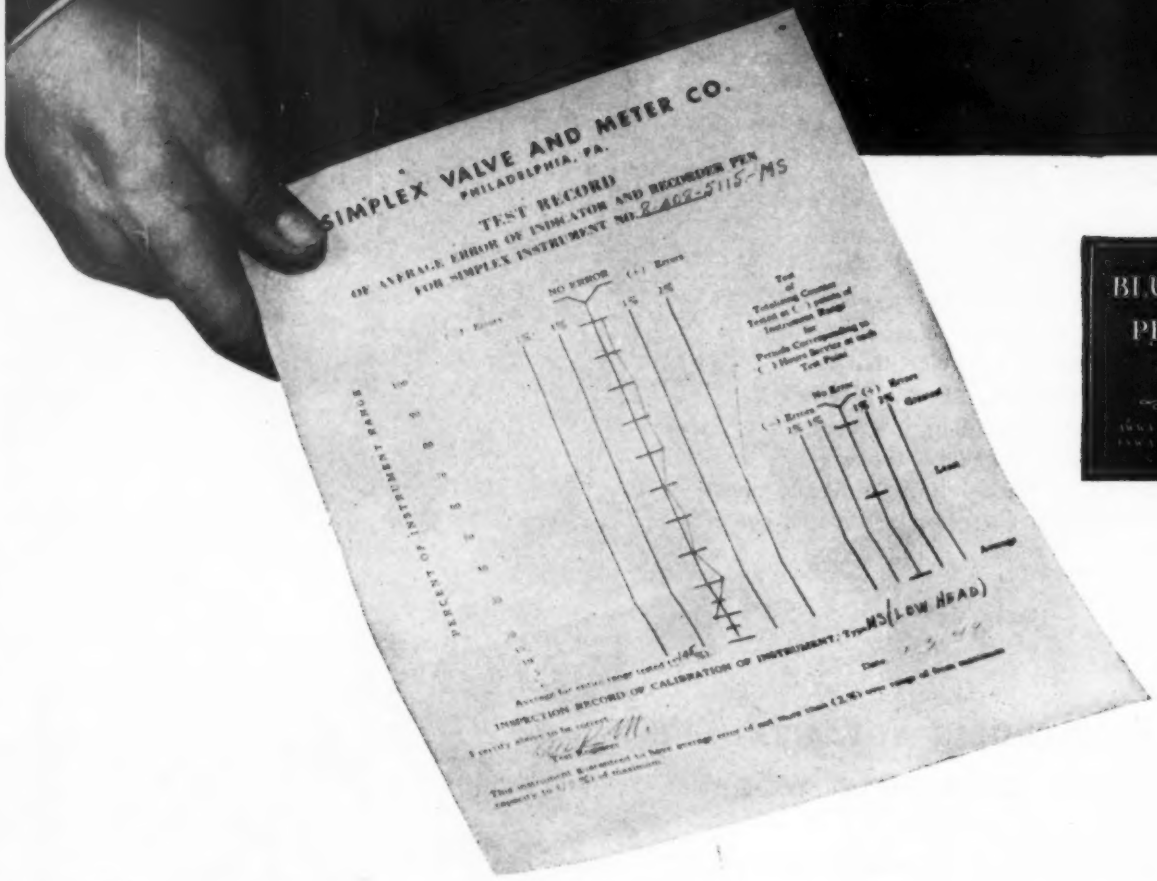
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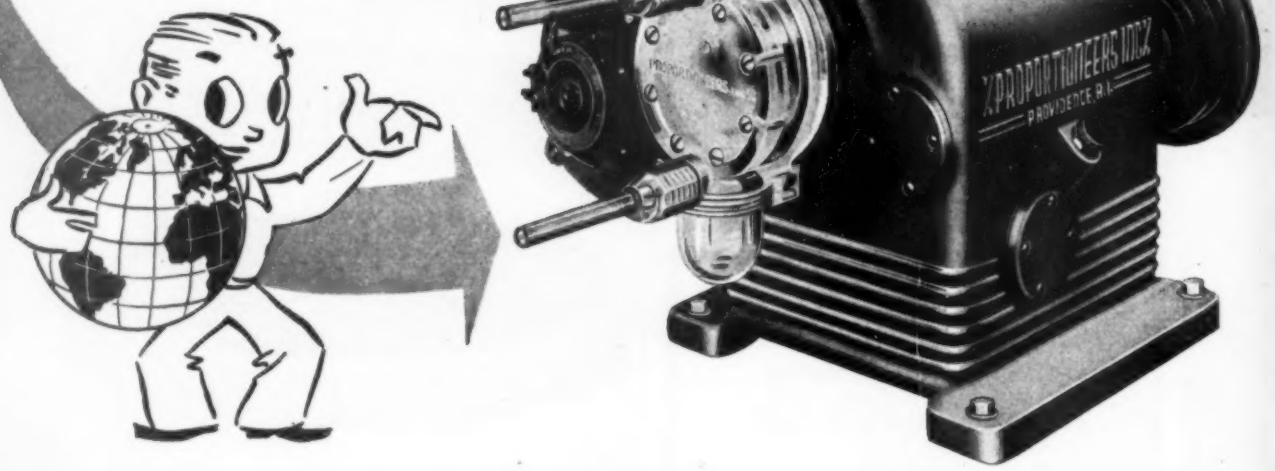

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E. S. Gillette, Publisher

EDITORIAL OFFICE
155 East 44th Street, New York, N. Y.
L. H. Enslow, Editor

COMING!

With Regrets!

We have found it necessary to hold over for another month the report of the Clarksburg meeting of the West Virginia Section of A.W.W.A. This issue carries the considerably delayed report of the meeting of the Missouri Water and Sewerage Conference and in chronological order the West Virginia report will follow in our next issue. Because of the limitations on paper use and the necessity of holding to a reasonable balance between meeting reports and other material in each issue, we have been unable to run meeting reports as promptly as in past years.

"Standards for Water Service"

Is the story of methods, developed in Richmond, Va., and the establishment of certain "standards" for water service which has involved careful forethought, study and trial prior to adoption as "official standards" by the Common Council. Involved are "Pressure Standards"; "Permissible Sizes of Service Lines and Meters"; "Basis for Installation Charges for Service Lines and Meters." These last two "standards" will be of especial interest to every water utility manager. This meaty contribution comes from a name already well known for innovations and economy measures—

MARSDEN SMITH, Chief Engineer,
Dep't of Public Utilities, Richmond, Va.

"A New Means of Financing Sewage Treatment"

Is disclosed in an article of timely interest at this juncture when the problem of financing of sewage disposal projects in post-war planning is occupying the front of the stage in many communities. A recent Ohio law makes it possible for a goodly portion of surplus funds from operation of Water Departments to be utilized in financing operation, maintenance and construction (enlargement or replacement) of Sewage Treatment Works. This story is told by one who was largely responsible for the working through of the new Ohio law—

W. R. LA DUE, Supt. and Engineer,
Dept. of Water Sewerage, Akron, Ohio.

"A System of Planned Maintenance"

Like many another water supply practice that is progressively out in front in the operation of the St. Louis County Water Co., the system of "Planned Maintenance" which has proved its worth to this efficiently operated and maintained water utility is to be described by—

VANCE C. LISCHER and
HERBERT O. HARTUNG,
Production Engr. and Sanitary Engineer,
St. Louis County (Mo.) Water Co.

"The Advantages from Waterworks and Sewerage Under One Management"

Are related by one who has now had several years of experience as head of the sewerage system as well as the water supply system of a thriving small city. In as much as the general trend is in the direction of combined operation and management of these two closely allied public utilities, this article will serve to clarify the minds of those who contemplate the coming of joint operation of these two utilities in their home community. The enthusiastic author is—

JOHN W. PRAY,
Manager of Utilities, Fort Dodge, Ia.

"Special Sewer Service Changes For Industrial Wastes"

Is an interesting account of how a large city developed through survey and analyses formulae for applications in making charges for sewer service and treatment of waste from several industrial plants connected to the municipal sewer system. First a General Formula was developed and to this is applied the proper factors to arrive at the equitable charge for handling and treating the specific industrial waste. This development constitutes a pioneering effort in the direction of charging industry for treating its wastes on an equitable basis. The authors—

GEORGE E. SYMONS,
Former Chief Chemist; and
FREDERICK W. CRANE, Structural Engineer,
Buffalo (N. Y.) Sewer Authority.

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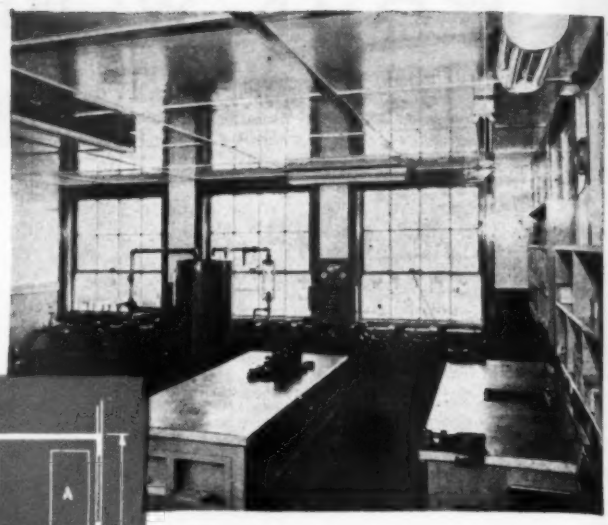

Above: North Elevation of Meter Shop, Cleaning Bench in lower center.

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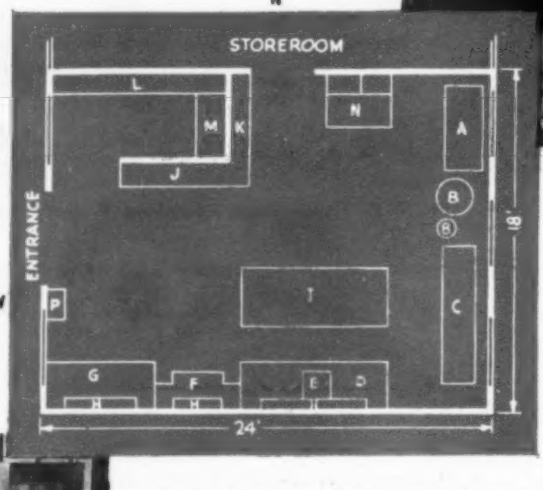
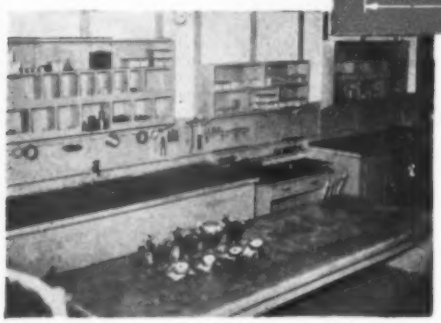
• *J. A. Mitchell, Foreman*



Below: Work Bench Section. Center section for Gear Trains and Registers. Note orderly tool arrangement, also special tools, casing stocker, control block locator, gear train block, etc.



A — Single unit test bench for large meters.
B — Ten cu.ft. and one cu.ft. tanks used with both A and C.
C — Ten unit test bench for small meters.
D — Two space meter repair bench L. 8', W. 30", H. 37".
E — Sink countersunk in above.
F — Small parts bench. For registers, gear trains, etc. L. 5', W. 23", H. 31".
G — Finishing bench for repaired meters L. 6'3", W. 30", H. 37".
H — Wall bins and tool boards containing parts and tools for use at respective benches.
I — Service bench used in conjunction with D. L. 8', W. 36", H 37". Underneath metal top this bench is divided into four equal shelves thus providing storage for 120 incoming meters and meters in various state of repair.
J — Storage for finished ⅝" meters. Capacity 160 meters.
K — Storage for finished ¾", 1", 1½" and 2" disc meters. Capacity: ¾"-12, 1"-10, 1½"-4, 2"-3.
L — Floor to ceiling, parts storage shelves in alcove, made by J. & K.
M — Double deck shelf for portable test meter and field testing equipment. Also in alcove.
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P — Electric grinder and polishing wheel.

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• ***Mr. Mitchell may be justly proud of his repair shop, and we are proud of the part that Trident representatives had in working with him.***

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WATER WORKS & SEWERAGE

VOL. 91, No. 2 *A Gillette Publication* FEBRUARY, 1944

DEVELOPMENTS OF THE YEAR IN SEWERAGE AND INDUSTRIAL WASTES

By A. M. RAWN
General Manager and Chief Engineer
LOS ANGELES COUNTY SANITATION DISTRICTS
LOS ANGELES, CALIFORNIA

THE past year, 1943, has not yielded anything very startling in the way of improvements in the science of sewerage. This is not surprising because operators, shorthanded and harassed by lack of time and materials, have been largely concerned with just holding the line. Some advances have been made, and a few new and interesting theories and ideas have been propounded; but by and large, most any operator will declare that he was lucky to get through the year with a whole skin and, except in the very large organizations, will tell you that innovations must await the return of more nearly normal times.

Despite these restraints, some energetic members of the profession have gone forward a way with pretty good ideas and although no one has revolutionized the science, a few new and useful thoughts emerge to help toward a better practice.

Notwithstanding the fact that we have wartime current conditions to blame for a lack of startling advancement in 1943, it may properly be that we are reaching the flat part of the parabolic curve of progress, and the science of sewerage being pretty well perfected, it takes longer to make those strides which not many years ago were made in such a hurry. It is not hard to get a tremendous improvement in B.O.D. and S.S. when those factors are very high; but as they approach the vanishing point, or even get into the reasonably low percentages, each unit of reduction is a great and increasing task. From septic tanks to activated sludge and stage digestion was accomplished in record time and now the science appears to be pausing at or in the vicinity of the latter to see what, if anything, can be done to do a better job at the same or less expense.

Naturally no one is interested in anything so much as in the outcome of the war. However, operators are holding in mind that their obligation in protecting public health is a primary consideration and, aware of that responsibility, are cheerfully and seriously abiding by the multitude of restrictive governmental regulations and lack of the men and materials which render some phases of their tasks so difficult. At the same time they are doing their jobs in a creditable manner.

Sewerage Developments in W.P.B.

During the year there has been a continuing improvement in the mutual understanding between the Federal agencies and members of the sewerage profession. This has been largely brought about by the efforts of members of the Am. Soc. C. E. and Federation of Sewage Works Ass'n who found in Washington a sympathetic and understanding friend in the Director of the Government Division of WPB. With his

"Sewage Works Man of the Year"

Readers of Water Works and Sewerage will agree with us, we feel quite sure, in the matter of dubbing the author of this review "Sewage Works Man of the Year."

In watching "A.M." reach year by year to higher heights in the sanitary engineering and sewerage field we may take just pride in having picked such a winner as Associate Editor of "Water Works and Sewerage" some years ago.

In nominating "A.M." "Sewage Works Man of the Year" we cite a portion of his record of achievements in 1943. He was essentially drafted early in the year to direct the activities of the newly established Sewerage and Sanitation Branch in the War Production Board as its Chief. This he did admirably, but at a cost of personal sacrifices. To "A.M." every sewage works manager owes a vote of appreciation. From W.P.B. he already has it.

"A.M."

A more recent honor which qualifies "A.M." for our title is his elevation to the presidency of the Sewage Works Federation which is now feeling his power of leadership and driving force.

Then, too, when the Am. Soc. of Civil Engineers sought a member of its Board to undertake perhaps the most important and expensive job of its nature ever tackled by a committee of the society it picked Director Rawn for the chairmanship of its Committee on Employment Conditions, which seeks to set up machinery to protect and improve conditions of the employed professional and sub-professional engineer—a real service by the society to its majority membership.

With these three qualifications could we need more to accord him the recognition so richly deserved?
—L. H. E.

help and assistance, the difficulties, which perplexed operators as a result of ill-advised priority rating orders, have been ironed out to the extent that nine-tenths of all of the responsibility for observing wartime economies rests with the operators themselves. In return, the operators have accepted the responsibility and the WPB is relieved of a large block of burdensome and sometimes not altogether well understood work and decisions. Acceptance of responsibility by the operator is not optional with him. WPB orders have teeth in them, but the spirit of compliance with wartime regulations has been most gratifying.

Currently, much of the authority formerly vested in WPB, Washington office, is being transferred to the field offices and operators may expect some confusion as a result. Nevertheless such differences of opinion as may emerge from this change in locale of authority will not affect the priority rating order P-141 in which the operator himself, under the restrictions imposed by the order, is allowed to proceed a long way without reference to other authority.

With respect to War Production Board regulations, John W. Hepler of Michigan states the case for the sewage treatment plant succinctly and in completely understandable terms, to-wit: "It is not expected that there will be any new projects undertaken until complete treatment, approximating 100% removal of Messrs. Hitler, Mussolini and Hirohito, is definitely and permanently accomplished." Klassen, of the War Manpower Commission, supplements this by stating that during such an emergency as has been created by the war, engineering means the harnessing of the forces of nature for the destruction of man instead of for his use and convenience. There has been some confusion about restrictions upon extensions of existing projects and construction of new, and some criticism aimed at the military for extensive and costly sewage treatment plant construction in Army and Navy posts. It should be remembered that no carefully considered restriction was aimed at stopping essential civilian construction. The great difficulty has been to see eye to eye in the determination of essentiality with those charged with the responsibility of conserving critical material. It could not be expected that all would be harmonious; the great miracle is that there has been so little friction.

Sewage Plant Construction

Unquestionably the military forces have been over-sold on sewage treatment works, but the attitude should not be allowed to persist that this has been particularly detrimental to the civilian population or civilian construction. Gillespie, in California, speaking of plants at Military Posts, states in part: "There is an incongruity about the performance and perfection of the sewage plant compared with the temporary nature of the barracks themselves. Many among the military personnel, objecting to the seeming extravagance, have tended to blame the State Sanitary Engineer for such refinements, when in fact, I suspect that in most cases the requirements were prescribed by the military authorities themselves or were a result of the cost-plus system." In some respects this reflects the attitude of state health authorities elsewhere than in California. However, from a somewhat close contact with cantonment sewerage, this author states as his belief, that extensive and elaborate cantonment sewage treatment plants were not discouraged by State Health Officers, in fact many times the over-building of sewage disposal facilities was the direct result of military instructions that concurrence of State Health Officers was particularly desirable, and in most instances a prerequisite to the adoption of the type and character of sewage treatment plant to be installed.

Between 650 and 700 sewage treatment plants were constructed in the United States in 1942; about half for military purposes and the remainder to serve civilian population. Without accurate knowledge of the number built in 1943, it is safe to say that it is materially below that for 1942. Civilian plants have resulted from juxtaposition of war industries or military population, as a rule, and many millions of dollars of Lanham Act funds have been disbursed through the Federal Works Agency for the construction of such works. Rural sanitation in the Southeast and Middle South has been materially improved during the National Emergency. Many small cities and communities are now equipped with sewerage works and with adequate water supply where neither formerly existed. With all of its short-comings, the National Emergency may be said to have raised small community standards of sewage treatment in this country.

It remained for the City of Kenosha to apply a really high-toned name to a sewage treatment works, one which, by the way, will merit a good deal of consideration. The Kenosha plant is operated as a part of the city's water works department and is designated as the "Water Supply Protection Works." Under the circumstances, and many others of similar portent, it is not a bad sort of a name; and, for reasons of publicity it, or a slightly modified title, might be a good one to adopt. [And, may we add that Kenosha found it a much simpler matter to raise finances for the construction of a "Water Supply Protection Works" than for a Sewage Treatment Plant. —Ed.]

The Manpower Outlook

The manpower situation continues to become increasingly critical despite the high rating given sewerage operation and maintenance by manpower officials. There is cold comfort in the fact that the shortage will probably continue for the duration and undoubtedly grow more critical in certain areas. It has been proposed that to offset the labor shortage the individual be required to work more hours, but such an act is in part frustrated by the physical inability of those who have been allowed to remain in civilian pursuits to work for more extended periods. There is no universal panacea. The greatest help must come from the ingenuity of the operator and his ability to find short cuts in operation practice.

It now appears doubtful that termination of the National Emergency will see the return *in toto* of the great number of young sanitary engineers who have been assigned to military work. Some years will probably elapse before the sanitary engineering supply will equal the demand because of prospective military and resettlement activities by United States forces all over the world. In this connection there comes an item of interest regarding three British prisoners of war in Germany. These three men, during their period of enforced idleness, prepared themselves to pass the entrance requirements and examination of the British Institute of Sanitary Engineers (one being a Federation member, by the way). The British Red Cross arranged for the examinations to be given and for sending the papers back to England. All three passed and were elected to membership.

The year has seen the termination of two exceedingly troublesome regulations: First, the black-out and dim out have been lifted; and, second, regulations regarding steel conserva-

tion have been materially relaxed. One has only to have had to operate a metropolitan sewage treatment plant during the black-out, or even an extended dim out period, to realize the difficulties and hazards of such an occupation. Sewage plant operation at night is never an easy job. It becomes very difficult when the only illumination at hand is from a small cross cut in the otherwise blackened lens of a hand flash light. During the dim out period all of the lighting precautions which had been taken to prevent attempted sabotage were thrown overboard and operating staffs found themselves in the peculiar position of having to defend against possible saboteurs in the extensive areas covered with plant structures during periods when one couldn't see his hand in front of his face. In this trained watch-dogs proved to be of some assistance. Black-out and dim out periods are mentioned for the record only.

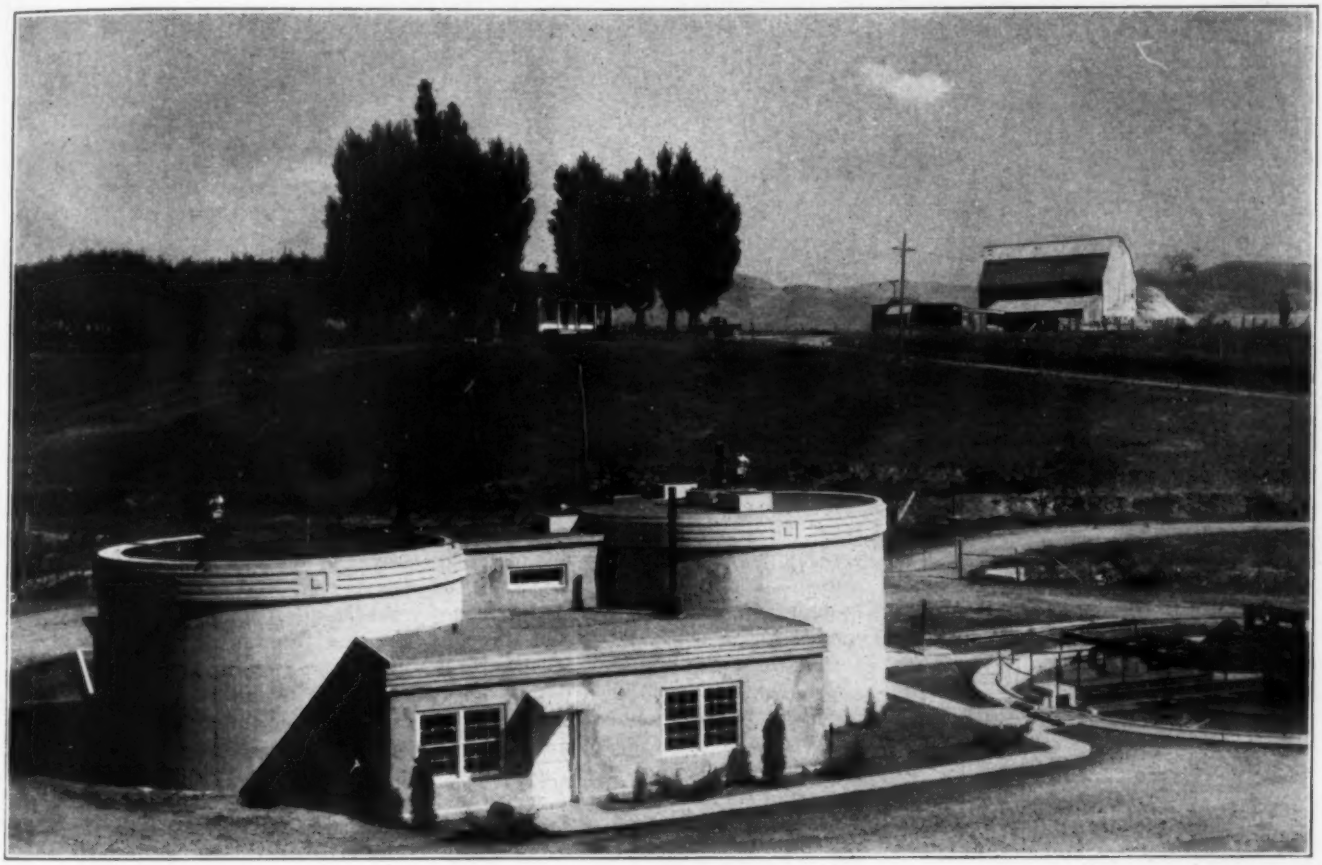
The Materials Situation

Substitutes for metal manhole covers and frames; timber gates for steel, and concrete without reinforcing are gradually disappearing and it is hoped will soon be things of the past. Wooden manhole covers and other unsatisfactory substitutes may now usually be eliminated by appealing from the Steel Conservation Order M-126, an operation which takes time, but generally gets results. Currently it has been stated that M-126 is due for revision and it is hoped, in this connection, that its administrator will see fit to exclude therefrom all reference to cast-iron sewer manhole frames and covers.

Research

On behalf of the Sewage Federation, Dr. Rudolfs has organized an extensive committee on research and has outlined a most optimistic agenda of investigation. Too exhaustive to comment on to any great extent, interested individuals are referred to the Sewage Works Journals for 1943 for a complete outline of the work proposed to be done, and it is the author's guess that he who looks will find his name some place among those who are to be put to work on the job.

The USPHS at Cincinnati, in its investigation on stream pollution, concludes, with respect to the disposal of sewage effluent into rivers, that decomposition products of domestic sewage and other putrescible organic matter encourages the growth of plankton, which growth is reflected in an increase in fish population. They state that, while untreated or raw sewage may produce a toxic area below the sewer outlet when the sewage is decomposed by bacteria, the stream from that point on is benefited by the fertilizing action of the decomposition products; and that, with sewage which has received proper secondary treatment, the toxic or degradation zone does not exist and the entire stream will be benefited biologically. Continuing their investigation they issue the statement that, of industrial plants investigated, the per capita contribution of domestic sewage per day is surprisingly low, approximately 22 gallons per capita with .049 pounds B.O.D. and .059 pounds Suspended Solids.

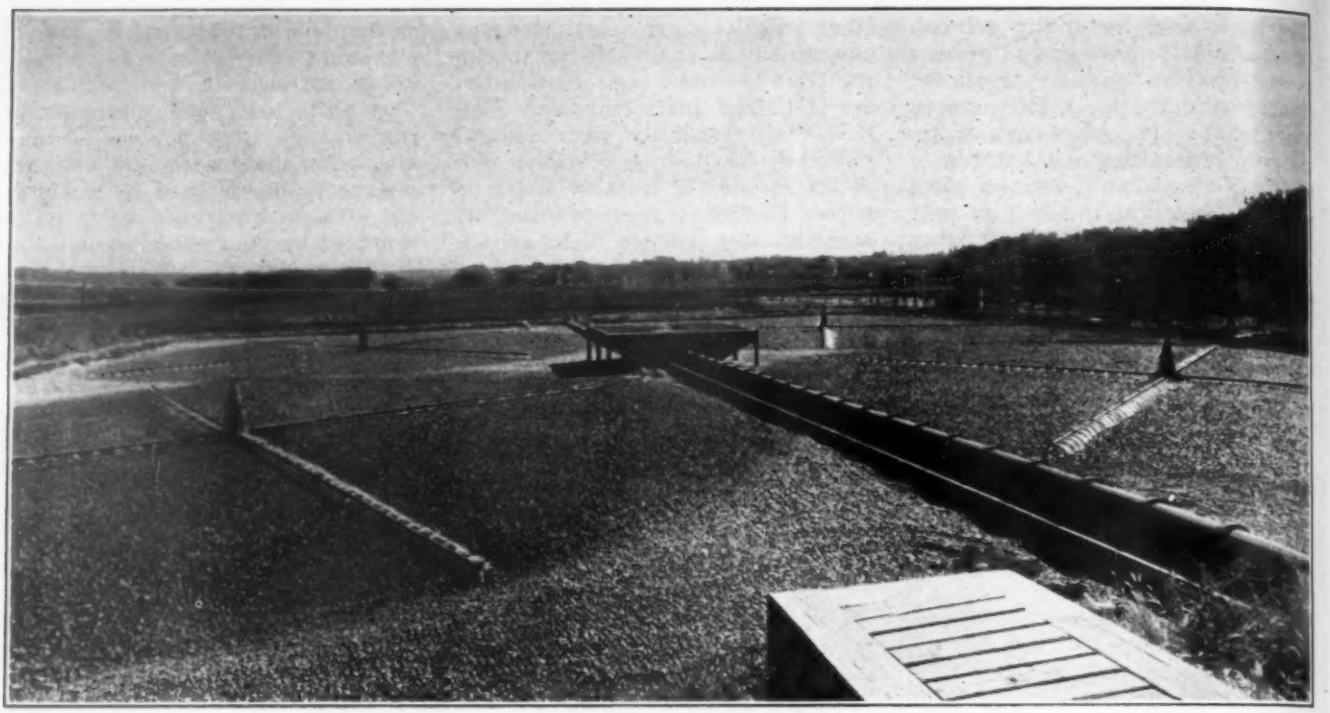


In the Land of the Spud, Sugar Beet and Wide Spaces

For Preston, Idaho, This Neat Little Plant Completed in 1943, Consists of a Dorrco Clariflocculator and a Two Stage Digestion System

Industrial Wastes

Some attention has been directed to industrial waste. Klassen and Mohlman discuss TNT wastes, Klassen stating that wastes from all TNT plants are not alike. He states that the wastes from the plant he investigated were acid in character and possessed a distinct red color. The color was found to be a function



A Case of Conversion of Low Rate to High Rate Filtration
At Sioux Falls, S. D., the Old Trickling Filters Were Converted to High Rate Filters with Rotary Distributors 197 ft. Each in Diameter. This Plant Treats a Mixture of Meat Packing Wastes and Sewage and in the Modernization Piping Was Rearranged to Provide Recirculation and Stage Biofiltration

of the pH and the acidity was, to a large extent, neutralized by lime sludge from the manufacturer's water softening plant. At about neutral pH wastes were not harmful nor objectionable in color. Mohlman, describing TNT wastes, stated that the acidic wastes are high in color but are very low in toxicity and have no B.O.D. of consequence; but the intense colors persist even in high dilution and are difficult and expensive to remove.

Copper salts entering the sewage of the City of Kenosha in rinse waters from five copper and brass products plants was effective in inhibiting sludge digestion. The sludge was found to contain 3000 ppm of copper. Kenosha determined that 200 ppm proves a strong deterrent to sludge digestion. The cure for the situation was to discontinue acceptance of the copper bearing wastes in the City sewers. [In this instance the industry, which for some years prior to municipal sewage treatment had been discharging its wastes into the Kenosha sewer system, is questioning the rights of the City authorities to order discontinuance of sewer use unless the wastes are first adequately treated to prevent interference with Kenosha's new Sewage Treatment Works. The decision of the Court in this important case is now expected daily.—Ed.]

Mahlie at Fort Worth directs attention to the absence of suspended solids, but the high B.O.D. approximating 100,000 ppm of packing house blood. The blood, floor washings and paunch contents, are the most serious of slaughter house contributions. Boiler blow-down water and domestic sewage are of little moment in comparison. He recommends the use of blood for manufacture of certain types of sausage; states that valuable by-products may be claimed from floor washings; and that paunch contents should be excluded from the sewer as being bulky, undigestible, and of no value.

Because of the low specific gravity of spongy, synthetic rubber crumbs, Schaetzle of Akron, states that they do not settle out thoroughly in the subsidence tanks, but flow on to deposit in the sprinkling filters and clog the stone beds. They generally disrupt operation because those which do settle cause the sludge to be light and fluffy.

Gray and Ludwig, with respect to potato dehydration state: "In very few dehydration plants would the installation of advanced treatment be justified. If a high degree of treatment is essential it may be cheaper to shut down and move the plant to a more favorable site." They advocate primary sedimentation plus effluent disposal by irrigation.

Activated Sludge and High Rate Filtration

As is usual, the most extensive investigations have been in the realm of activated sludge. Mallory continued development of the "oxidation index" as a control of the activated sludge process. He claims for the index that, being based upon the physical relationships existing between effective aeration and sedimentation periods, as well as involving the consideration of good plant design and practical working quantities of sludge in suspension, is a much better measure of plant operating efficiency than either the bulking index or the sludge index as propounded by others. He insists that while the "oxidation index" finds a universal application, the other indices may not be applied to all plants, and that to generalize upon them as a measure of efficiency is incorrect and misleading. If the sludge or suspended solids in a plant are reaching a condition which will destroy the plant balance, the Mallory methods of approach are appealing, and the plant mathematics and determinations appear to be rendered extremely simple. The so-called "Oxidized Sludge Process" in which the Mallory factors are involved is undergoing a carefully supervised test in the Ann Arbor (Mich.) plant under the superintendence of Shephard of the Michigan Dep't of Health and a committee composed of members from Sanitary Engineering Divisions of other states, plant operators and consulting engineers. These tests are being conducted as a result of confer-

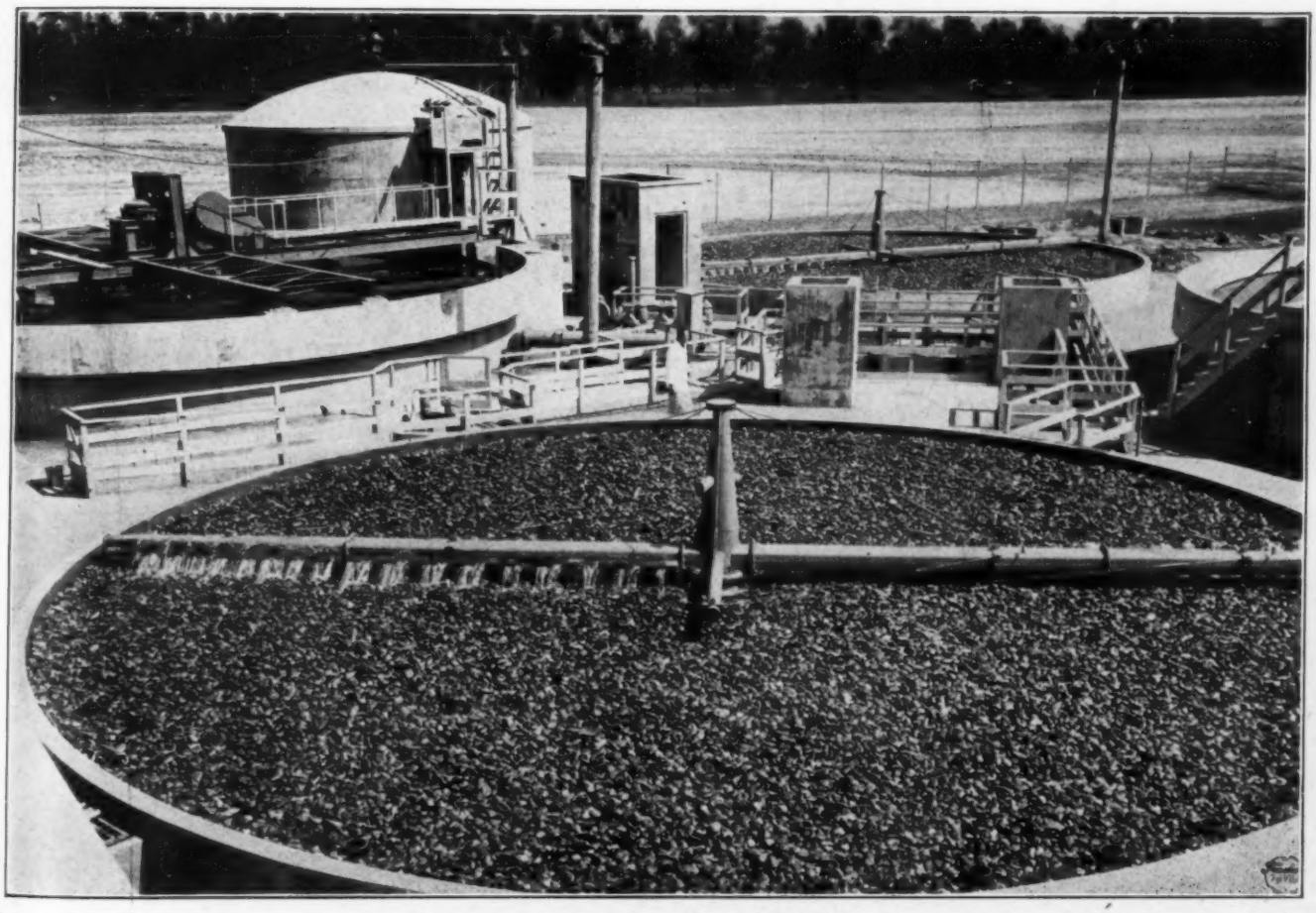
ences of 35 sanitary engineers who met last Fall at Ann Arbor to analyze Mallory's claims. More recently the tests are being applied also at the Madison, Wis. plant under supervision of Mackin. It is understood that the findings at both plants are to be published.

Smith of Lima, Ohio, states that chlorination of the return sludge has been successfully used for nine years at his plant to correct sludge bulking. He states in part, that when the sludge blanket, indicated by one hour's settling, is greater than 20%, return sludge chlorination should commence. Quantitatively, sludge should be chlorinated at the rate of from six to nine ppm and recovery may be expected within seven days after the beginning of chlorination and has been accomplished in three days.

Experimenters at Two Rivers, Wisconsin, say that little, if any, good was accomplished there by preaerating ahead of the activated sludge process. There was some improvement, but not enough to justify the use of the extra air required. Other conditions being equal, there appeared to be a slight benefit in B.O.D. and suspended solids removal by returning waste activated sludge to the primary tank, although the increased efficiency was not impressive. Stage dosing of activated sludge could not be evaluated because of back-flow conditions. Such experiments as were conducted at Two Rivers indicated that no benefits were to be derived from stage dosing.

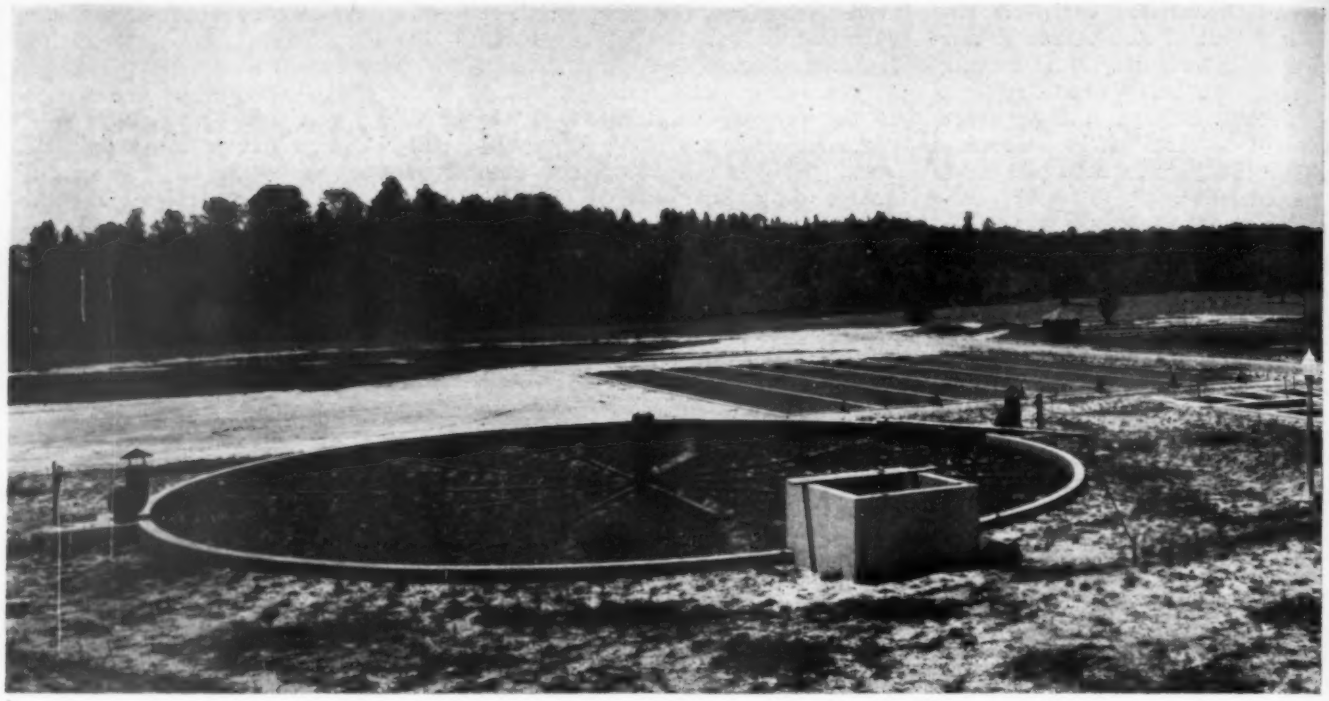
Short-period aeration experiments were conducted at the Wards Island plant by Setter. His published conclusions are of great interest, in disclosing that weaker sewages are amenable to effective aeration treatment in less than three hours, but that it is mandatory that good aerobic conditions be maintained in both the aeration and final tank every hour of the day. Under the specified conditions, he indicates a reduction in suspended solids and B.O.D. in one and one-half hour's aeration of mixed liquor to be 75%; and to reach 85% an added one and one-half hour aeration was required —i.e., double the aeration for the 10% improvement gained. Aeration *without* return sludge yielded reductions of 30 to 60%, increasing with the longer period. [These New York City studies are expected to yield enormous economies in future plant construction and operation under the short period aeration scheme, assisted by other procedures if and when required.—Ed.]

Two investigators, Holtje and Wattie, have done an excellent job of classifying respectively, filter bed inhabitants and activated sludge and trickling filter bacteria. In both instances extensive microphotographs are shown and the reader is spared—to quote Holtje—"the phobia of the long and seemingly unpronounceable Greek and Latin names given most organisms." Wattie concludes in part that the cultures isolated from activated sludge bind themselves together tenaciously enough to remain intact under agitation sufficiently violent to keep the floc suspended and to maintain aerobic conditions. Floc-forming organisms isolated from trickling filters will, she states, de-



Perhaps America's Most Interesting Plant of the Year

Kaiser Co.'s, Fontana, Calif., Plant Which Provides Complete Treatment of All Sewage and Steel Mill Waste Waters. These Waters Are Recovered for Reuse in Plant Operations and no Wastes Leave the Fontana Plant—Proving That "It Can Be Done"



The High Capacity "Aero-filter" of the Spartanburg, S. C., Plant Extension

velop an activated sludge and function similarly.

High capacity filtration, which has received a tremendous impetus from cantonment plant construction, is described in part by Darby of the Dorr Co., who presents certain factors of interest in plant computations. He says in part that calculated removal should include consideration of digester supernatant and recirculation water. With those factors in the picture, the primary clarifier, filter and secondary clarifier accomplished respectively 60.2%; 31.7%; and 8.1% of the work done by the plant. Disregarding the supernatant, the work accomplished became, respectively, 45.8%; 43.2% and 11.0%. His investigation illustrates the advantage of recirculation, particularly as applied to liquids of especially high oxygen demand and negative potential.

Greeley classifies high rate (or capacity) trickling filters as "Aero," "Accelo," "Bio," Back-wash and Roughing. He says that the common understanding of the term high rate filter implies one operating un-

Tile Media of the "Aero-filter" Designed for Treating High Concentration Industrial Wastes

This Is One of the Smaller Units Equipped with Impeller Type Distributor

der a load of 3000 pounds or more B.O.D. per acre-foot per 24 hours. Two to three hours aeration in a conventional six hours aeration period activated sludge plant presents a comparison between high rate and standard rate filters. Greeley suggests a Government Commission to review the operation of military sewage treatment plants and make the data available to all the profession. Certainly a valuable contribution would result.

Captain Dixon, Corp of Engineers, tends to discredit the belief that dosing rates between 600 lb. and 3000 lb. B.O.D. per acre-foot day are dangerous and cites examples to disclose successful operation at rates intermediate to these. Amongst the interesting disclosures of Dixon is the fact that all of the secondary tank sludge in the Dallas plant has for more than a year been returned to the trickling filters (draining chambers); and, through the process of "wet burning" through the filters, no secondary sludge has had to be transferred to the sludge digesters, directly or indirectly. The sludge delivery to the filters is in conjunction with recirculation.

Of the Hays process Dixon says that this relative newcomer to the field will continue to be improved by re-design of its troublesome parts and re-adjustment of its component elements. To date experience with the Hays process has reflected hurried design, mediocre operation and lack of background—difficulties not at all peculiar to the Hays process alone.

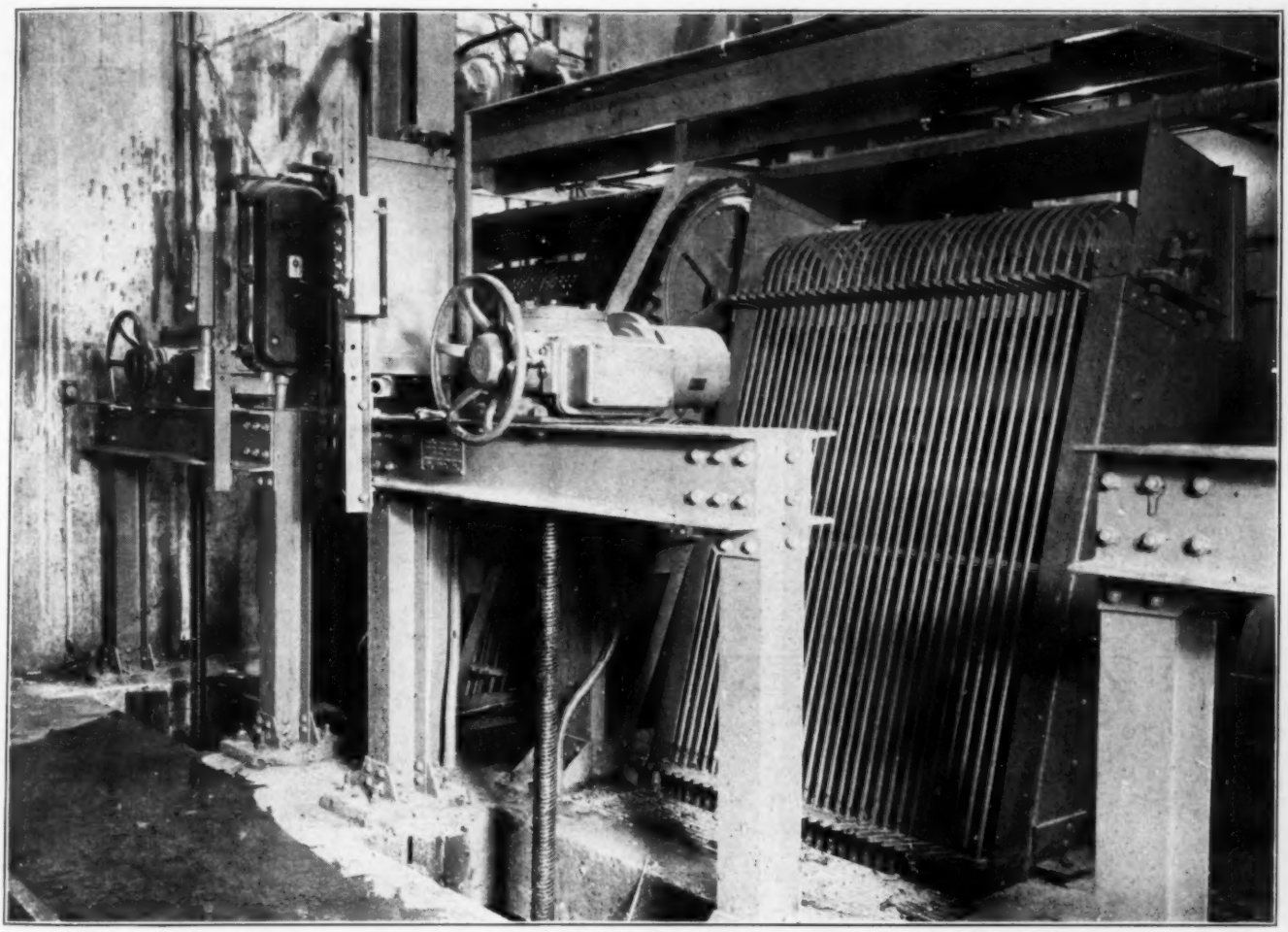
Sludge Digestion

The author desires to comment that, after more than a year of using live steam for preheating sludge at the plant under his general direction, the process is eminently successful. No difficulties have been experienced in maintaining constant temperatures in the sludge digestion tanks despite widely varying sewage temperatures. The simplicity of the process commends it to use unless it is concluded that the sludge gas used for heating the water is of greater advantage elsewhere.

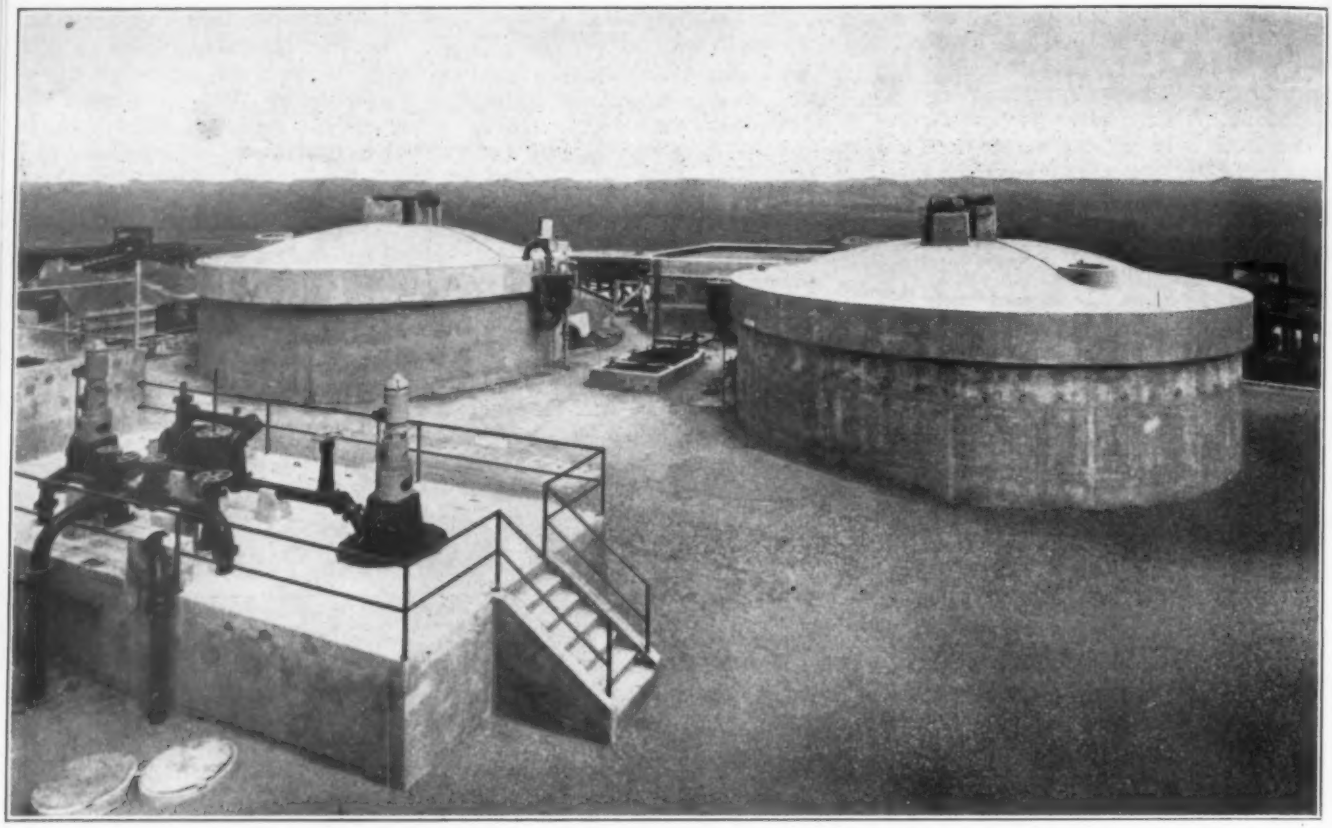
Apropos of sludge heating, Gunson at Denver, describes the necessity for keeping the temperature of both stages in the 2-stage sludge digestion plant the same. He concludes that a 5- to 8-degree differential in temperature between stages 1 and 2 causes the sludge being transferred from the first to the second stage to rise and prevents the formation of good supernatant liquor. By observing the rule of like temperature in the two stages, and by maintaining low pressure over the digesting mass, Gunson reduced average solids concentration in the supernatant from 2% to 0.5%.

Snell, discussing anaerobic digestion, corroborates Pomeroy in stating that nitrogen is not lost as gas but is dissolved in supernatant liquid, and that drawing off the supernatant may account for all of the nitrogen loss in regular plant digestion. This, he states, is in contrast with many investigations by others previously.

In some interesting studies on the digestion of paper pulp, Straub, determined that by controlling the carbon to nitrogen ratio, that is, by cor-



The New Jeffrey Bar Screens—with Cleaning Rakes Approaching the Bars from the Back Side



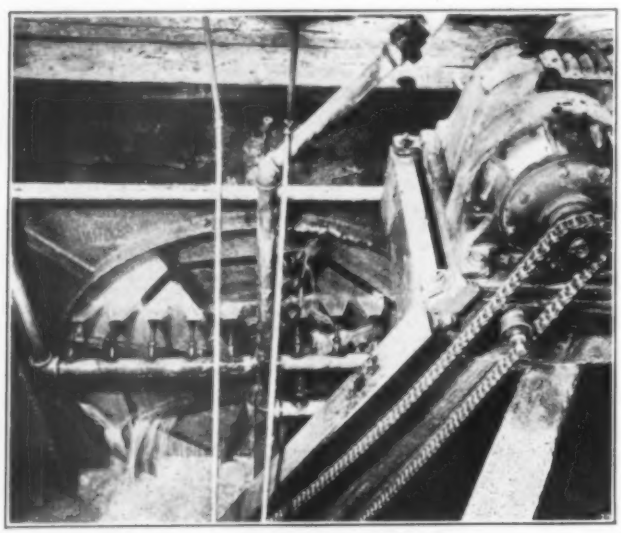
The New Dorrco "Vacuators" at San Diego, Calif.

Designed to Remove Scum and Grease from 20 M.G.D. Sewage Flow in Which the Sewage Is Flash Aerated and Passed Through Short Period Scum Separators Under Partial Vacuum

rect quantitative mixing of paper pulp and sewage sludge the former could be successfully digested, although it was necessary to lime the mixture to prevent acidity. He found that the amount of gas produced per pound of paper pulp destroyed was less than half of that produced in conversion of a pound of sewage solids, and that the gas from the pulp contained a much higher portion of carbon dioxide than the gas from sewage sludge alone.

Sludge Gas Engines

Sludge gas engines are becoming the rule rather than the exception at sewage treatment plants. Certainly in new installations advantage of this natural and valuable fuel by-product of sludge digestion will be utilized. Paradoxically enough even though a portion of the gas evolved by sludge digestion is used to control temperatures, that amount is not entirely lost because controlled temperature is such an important factor in uniformity of production, and the amount used in temperature control may be said to be taken from what would otherwise be peaks of production and, without storage, be lost.



Jeffrey's New Vertical Disc Screen

Developed for Screening Wastes from Meat Packing Plants and Other Industrial Wastes Carrying Large Quantities of Screenables

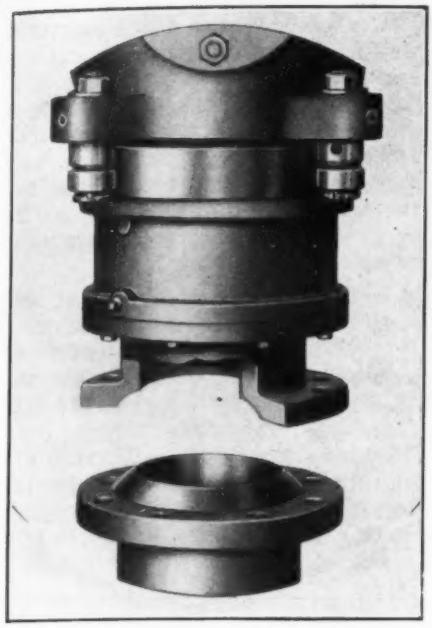
The Fort Dodge plant, reporting accomplishments during the fiscal year 1941-42, indicates a cost per kilowatt hour of 1.13 mills for operation only. Including depreciation, the cost is less than 1.8 mills. Surplus power is sold to a private utility at 8.5 mills per kilowatt hour and the saving to the plant, by virtue of the gas engine, is reckoned at about $8800 for the year.

Commenting similarly, the management at Cedar Rapids, Iowa, reports for the fiscal year 1942-43 a total cost for generating in excess of one million kilowatt hours, $1,190.96, of which $1,113 was returned to the plant from the sale of power to the power company. Gross charges, including all costs less revenue from the sale of power, were a little over $2,000 for the year—a saving in excess of $3,000 over the cost of commercial power at eight mills per kilowatt hour. The sale of power from sewage treatment plants opens a new field of possibilities.

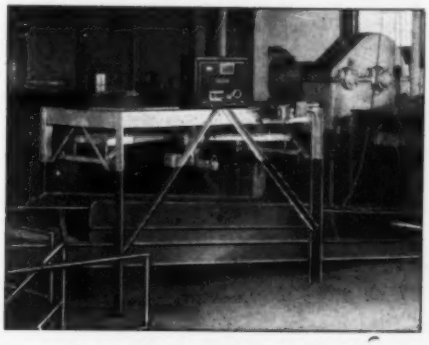
Equipment Developments of 1943

Aside from the new tools and machines which were applicable to either water or sewage plants (see Morris'

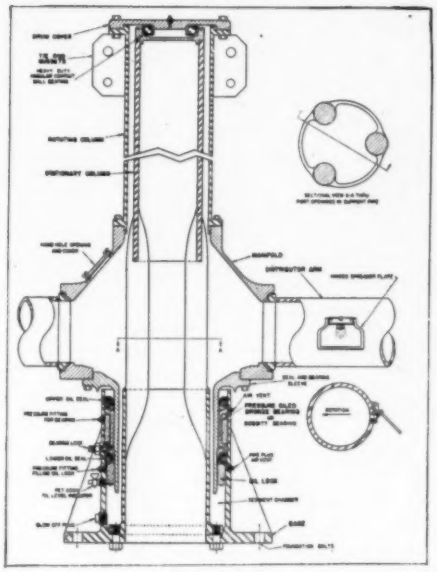
Amongst New Equipment of the Year



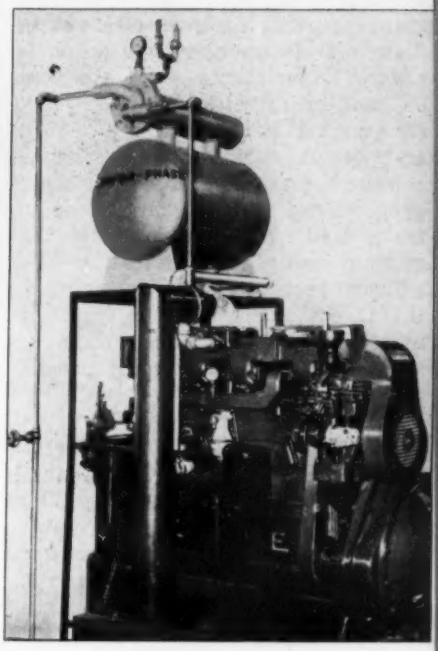
Yeomans Leveler for Rotary Distributors
(Yeomans Bros. Co.)



Toledo Chronoflo Totalizer Scale
(Builders-Providence Co.)



The Mercury Saving American Oil Seal
Developed in '42 and Proven in '43 by American Well Works. This Ingenious Oil Seal for Rotary Distributors Ends the Perplexing Problem of Lost Mercury—Especially Critical at This Time



Vapor-Phase Cooling Systems for Engines
(Pacific Enterprise Products Co.)

review of Water Supply Developments in the January issue), there were some new developments of equipment especially for sewage treatment. Probably the largest of these items were the Lakeside Clarifilter and the Dorrco Vacuator. The Vacuator has already found use in several army and industrial plants where its principle of removal of finely divided solids by aeration and vacuation to cause a flotation of tnese nonsettling particles has proven effective. The Lakeside Clarifilter is a combination clarifier and peripheral contact filter, where the aeration serves simultaneously as a floc builder and means of grease separation.

Two other developments of interest were Yeoman's Rim Drive Clarifier mechanism and a Leveler for Rotary Distribution. The rim-drive clarifier mechanism offers a positive drive mechanism with reduced torque demand, lower maintenance and less wear, as well as the elimination of bridges, walkways, and gear reduction assemblies. The leveler mechanism for rotary distributor arms makes it possible to easily maintain the arms in perfect alignment.

American Well Works offered the Camp Regulator for Grit Chambers, in which it is possible to maintain a properly distributed flow and controlled velocity. The introduction of American's oil seals for rotary distributors rather than mercury seals came in 1942, but the final development and actual application took place during 1943. Since mercury is so highly critical and so easily lost, this unique oil seal proved of immediate interest and is reported to be entirely satisfactory.

A system of Vapor-Phase Cooling for gas engines by Pacific Enterprise Products Co. of Los Angeles constituted equipment news in the sanitary field although it had previously been used by industry.

The Toledo-Chronoflo Totalizing Scale offered by Builders-Providence gained acceptance for use in weighing sludge cake, and a new Reeves' variable speed drive and combined gear reducer for use on sludge belts, feeders, etc., proved to be other new equipment of 1943 of principal interest in the sewage field.

Items of General Interest

That about covers the items which may be strictly cataloged. Here and there an idea emerges which may be of interest or benefit. Among them the experiments by Straub on the digestion of pure vegetables. Briefly, he concluded that of cabbages, carrots and potatoes, the cabbage leaf was most resistant to digestion and that the skins of potatoes did not digest as readily as the pulp. He found digestion gas from vegetables to contain more CO_2 than the gas from fresh sewage solids.

Rudolfs has added to his already extensive published information to describe methods of sludge thickening by flotation and settling. In brief, he concludes that a dense sludge can be produced by either method. With flotation, resulting from the addition of calcium hypochlorite, a sludge varying from six to ten per cent solids was produced in 48 hours.

In the West, Rowntree of the Carmel Sanitary District devised a unique method for aerating digester supernatant liquid. He discharged the supernatant overflow pipe at about the sludge level in the digester and cascaded it down over a fish ladder and by this means aerating and greatly improving its settling characteristics. He probably would be surprised as hell if he found a salmon holding his nose while climbing the fish ladder some morning!

Break-point chlorination applied to sewage by Groff and Reidenour points to the following conclusions, among others: That sewage can be chlorinated to a "break-point" but that chlorination to that degree does not result in greater 5-day B.O.D. reduction than is ordinarily obtained

with low doses, but it does render the reduction permanent. Heukelekian, reporting upon the effect of sodium nitrate on hydrogen sulphide, says, "Experiments with additions of sodium nitrate to sewage have shown that sodium nitrate reduces and delays sulphide production in sewage," and that the effects are proportional to the quantity of nitrate used. He further states that mixing sewage with trickling filter effluent results in the lowering of B.O.D. equivalent to the nitrate content of the effluent. The author suggests that this may be a possible factor in purification in high capacity recirculation filters.

The Clay Products Association and W. P. B. in a joint effort have standardized vitrified clay sewer pipe. Two classes of pipe—Standard and Extra Strength—and three manufacturing zones are designated. Although indicating some lack of agreement among clay pipe manufacturers, the net result is of benefit to sewer designers and builders. Amongst other things, it sidetracks the ancient and totally inadequate A. S. T. M. specifications which have been used in lieu of some which have engineering design factors as a background.

Disease Transmission

Poliomyelitis as a water-borne disease still remains a question. Maxcy and Howe believe that it does not act like a water-borne disease because the incidence is not sufficiently widespread and outbreaks appear without regard to water supply purity. However, virus has been found in sewage. Recent investigations at the University of California are aimed at establishing certain conditions in the host as rendering the virus effective. The contention at the University is that the virus is exceedingly widespread, and were it not for the immunity of the host, polio would assume epidemic proportions at most any time. Experiments at the University of Michigan disclosed that activated sludge in amounts as low as 1,100 ppm. with six hours' aeration removed or inactivated virus to an extent sufficient to render it non-effective to mice when injected intracerebrally. Mohlman recommends it as important that sewage works research laboratories become familiar with the technique of isolation and study of the polio virus and that close contact be maintained between sewage technicians and medical research men on this important subject.

Cram, U. S. P. H. S., experimenting on the survival of Helminth Ova and Protozoan Cysts in sewage during various stages of sewage treatment, concluded that primary settling did not remove either entirely from sewage, that both cyst and ova could survive trickling filter and activated sludge oxidation; to the contrary, chemical precipitation with alum or slow sand filtration effectively removed both. Ascaris and hookworm ova survived sludge digestion and air drying. Heating dried sludge to 103° C. destroyed all organisms investigated. Cram's investigations are inspired by the increasing use of dried digested sludge in crop culture and the possible spread of tropical diseases brought home by returning invalided soldiers.

The Federation, which Secretary Wisely reports having increased from a membership of 411 in 1928 to in excess of 2,500 in 1943, has joined with other national organizations in urging post-war planning. Public works are, of course, the objective of anything the Federation may do. Sanitary engineers and operators, in cooperation with municipal and district officials, assume a grave responsibility in recommending what jobs are urgent in the post-war era and should counsel against the temptation to plan unnecessarily or to schedule construction sequence unwisely or illogically.

It is the author's hope that any federal subsidy in post-war construction will appear in the form of cheap money—cheaply borrowed by the U. S. and cheaply loaned in the purchase of lower government bank bonds; a little simple arithmetic will quickly convince one that 40-year bonds at 1½ per cent interest is about the equivalent of a 45 per cent grant on an otherwise 6 per cent issue.

First Strike by Sewage Plant Operators

Finally, an item which is unique in the annals of sewage works practice was the somewhat abortive union strike at the Buffalo plant. So far as is known, this constitutes the first organized walk-out of operators of sewage treatment works. The indignant citizens of Buffalo termed the strike "a crime against human decency," and while the non-strikers (skilled and professional employes of the plant) maintained chlorination of by-passed sewage, the Sanitary Board refused to deal with the strikers until they returned to work, following which they negotiated temporary increases in wages to offset the rise in living costs for the duration of the emergency.

Veteran Sewage Works Manager Retires

Julius Bugbee Served Half Century and a Year in Field He Pioneered

After 51 years of service in sewage plant operation, Julius W. Bugbee, Supt. of Sewage Treatment at Providence, R. I., retired on the last day of 1943. Mr. Bugbee had operated the sewage plants in Worcester, Mass., and Providence, R. I., and with this long record of service holds the distinction of being the "dean of sewage plant operators" in this country. To our belief he is America's oldest living sewage works operator. Naturally, Bugbee was a charter member of the Quarter Century Club, which meets yearly during the annual meetings of the Sewage Works Federation, of which he was an honorary member.

Julius W. Bugbee

Fifty-one years is a long time in sewage treatment. In fact, it practically covers the span of modern sewage treatment. When as a young man Mr. Bugbee first "got a taste" of sewage, the famed Lawrence Experiment Station of the Mass. State Dept. of Health was but seven years old. Imhoff tanks were unheard of, chlorination wasn't even practiced in water plants, separate sludge digestion, gas collection, sludge incineration were ideas to be developed by the coming generation of sanitary engineers.

It was at Worcester in 1904 that the first improved grit chamber was installed with multiple channels and velocity of 0.5-1.0 foot per second and detention period of one minute. The first trickling filter was only two years old. And, activated sludge wasn't to be heard of for nearly 20 years when Mr. Bugbee became a sewage plant operator. Not only has Mr. Bugbee seen the growth and development of modern sewage disposal, he has contributed to it. His retirement takes from the operating ranks one of the deserving pioneers in the game.

A.W.W.A. BOARD ACTIONS

Newkirk for President; Thompson for Vice-Pres.; Brush for Treasurer. Diven Medal to Howson and Goodell Prize to Chamberlin and Glass. Honorary Memberships to Burdick, Hale and Wiggin. Milwaukee Conference in June Assured.

THE annual meeting of the Board of Directors of the American Water Works Association, held in New York on January 17 and 18, was attended by thirty-two of the thirty-four members. Amongst this practically 95 per cent attendance was the Director from the Cuban Section for the first time.

One of the first actions of the Board was the meeting of those Directors from the several Sections, as the Nominating Committee, to choose officers for the year 1944-1945. The following were chosen as the official nominees, which is tantamount to election unless before March 1st contestants are nominated by the membership at large. The term of the new officers begins with the close of the 1944 Conference in June.

For President

Samuel F. Newkirk, Jr., Engr. and Supt., Board of Water Comm., Elizabeth, N. J.

For Vice-President

Leonard M. Thompson, Gen. Supt. and Engr., Water Department, St. Paul, Minn.

For Treasurer

William W. Brush, Editor Water Works Engineering, New York.

Three Voted Honorary Memberships

The Board voted Honorary Memberships to the following distinguished members:

Charles Baker Burdick, Consulting Engr., Alvord, Burdick & Howson, Engrs., Chicago.

Frank Eugene Hale, Director of Labs., Dept. of Water Supply, New York City.

Thomas Hollis Wiggin, Consulting Engr., New York, N. Y.

Awards

The two highly prized awards of the Association—the Diven Medal and the Goodell Prize—were voted the following members:

To **Louis R. Howson,** Consulting Engineer of Chicago and past president of AWWA, the John R. Diven Medal, "For his many services and numerous valuable contributions to the advancement of the water works field."

To **Noel S. Chamberlin** and **John R. Glass,** of the Research and Development Dept. of Wallace and Tiernan Co., the Goodell Prize, "For their papers on the subject of 'Colorimetric Determination of Chlorine Residuals,' which appeared in the August and September issues of the Journal."

Continued Restrictions on Copper Tubing and Alloys Objected to by Board

In view of the easing up of the copper situation in the war effort and the knowledge that restrictions had been eased by the Copper Administrator in respect to the use of copper for certain specific commercial applications for civilian use, AWWA's Committee on Wartime Activities recommended the passing of three resolutions directed to the Office of War Utilities. These resolutions and the reasons therefor, presented by Louis R. Howson, chairman of the War Activities Committee, were unanimously voted. In effect they follow:

(1) The Board of Directors of AWWA respectfully directed the at-

Samuel F. Newkirk, Jr.
Choice for Presidency

Leonard N. Thompson
Choice for Vice-Presidency

Wm. W. Brush
Renominated as Treasurer After 18 Years of Service

Louis R. Howson
The Diven Medal

Chas. B. Burdick
Honorary Member

Frank E. Hale
Honorary Member

Thos. H. Wiggin
Honorary Member

N. S. Chamberlin
The Goodell Prize

tention of the War Production Board to the conditions as set forth in the preamble and requests early and complete authorization to water utilities to use the copper tubing that they now have in hand and has been "frozen" for these past several months.

(2) Citing the importance of being able to employ copper tubing as service lines for many aggressive waters and corrosive soil conditions, the Board requested permission from W. P. B. for water utilities to purchase copper tubing in the open market or from other utilities for use where alternate materials cannot be considered as equal to copper or copper alloy pipe or tubing.

(3) Considering the less satisfactory or dependable service and life expectancy of cast-iron meter casings and having knowledge of the recent releases of copper alloys for other civilian uses, the Board requested W. P. B. to authorize the use of secondary copper base alloy ingot for the manufacture of water meter casings.

[Following the passing of the above resolutions, A. E. Gorman, Chief of the Water Division of W. P. B., addressed the Board in reference to a revised U-1 order about ready to issue and an amended copper limitation order M-9-C-4 in the making, in which restrictions on the use of materials for maintenance, repair and replacement were being materially eased. This was splendid news and since (on Jan. 22 and Jan. 24, respectively) these two amended orders, U-1 and M-9-C-4, have been issued, water utilities are now permitted to make use of *all* copper tubing on hand. In other words, the freeze order on copper tubing in the hands of water departments and water companies has been wiped off and the danger of such copper tubing being seized at sub-cost prices is something now of the past.

Asked what the chances were of a water utility now being able to purchase a limited quantity of *new* copper tubing, where it can be shown that there is a need for copper service lines in preference to alternate material, Mr. Gorman stated that the Water Division was ready to give every attention to such applications which evidenced specific need, and that copper could be gotten in these instances.]

New Drinking Water Standards Objected to

An important consideration of the Board, which received careful thought before passing of resolutions objecting to their practicability, were the new U. S. Treasury Drinking Water Standards. What focussed attention again on these standards was the recently issued "Emergency Minimum Sanitation Standards," in which the U. S. Public Health Service has incorporated standards applicable to the sanitation of public water supplies and advocates the official adoption by all state health agencies.

Before discussing these important standards, the Board had the benefit of hearing from a special committee composed for the most part of State Sanitary Engineers and a minority of Water Works Managers, requested to comment on the new standards. After the report and discussion it was the opinion of the Board as a whole that, if the terms of the new U. S. Treasury Drinking Water Standards be followed to the letter, such standards are so far reaching, drastic and impracticable in some of its sections as to make it impossible to comply therewith. Thus, many water supplies in reality amply safe would be considered sub-standard, with all of its implications and stigma resulting. This being an unnecessary and unwarranted discrediting of public water supplies generally and not constructive in truly advancing public sanitation, the following resolutions were adopted unanimously:

(1) That the attention of the Surgeon General of the U. S. Public Health Service is invited to the following sections of the 1942 Standards which, in the judgment of the Board of Directors of the American Water Works Association, should be reconsidered:

a. Sections 1.6 and 2.2 dealing with the definition of the water supply system.

b. Section 3.1 dealing with frequency of sampling water supplies.

c. Section 4.1 dealing with physical characteristics of water.

d. Appendix containing "Manual of Recommended Water Sanitation Practice."

(2) That the Surgeon General is requested to appoint representatives of the U. S. Public Health Service to confer with a committee of the American Water Works Association relative to the provisions and implications of these sections of the Standards with a view to modifications.

[Ed. Note: Especially objectionable to the Board members was the "Definition of the Water Supply System" in the Standards. As written, the water utility is considered responsible for quality of water up to the free flowing outlets in the consumer's home, hotel, factory, etc., whereas water works managers can have no jurisdiction in fact over the public water supply beyond the customer's property line, from which point the water flows through piping installed, operated and owned by the water taker. The water purveyor has no jurisdiction by law or otherwise (and can have no responsibility) on the consumer's side of his property line. Another objection of eminently practical proportions was the rigidity of the Standards and a lack of a sufficient and appropriate degree of judgment of sanitary engineers within the reporting agency, i.e., State Departments of Health, for the most part.]

Resolutions against the proposed "Emergency Minimum Sanitation Standards" of the U. S. Public Health Service were grounded on the same reasoning as the above and requested of the Service a review by a competent advisory committee with the view of securing desirable revisions. This resolution included a clause requesting state and local agencies to postpone, for the time being, the adoption of these minimum standards, looking to making them workable. Copies of this resolution were addressed to all State Sanitary Engineers.

Activities of the Water Works Practice Committee

In the absence of Malcolm Pirnie, Chairman of the Water Works Practice Committee, who that same day was presiding over the A. S. C. E. Board of Directors as its new President, the report was presented by Secretary Jordan. For the report in full see the February issue of the A. W. W. A. Journal. The more important decisions of the Board resulting from consideration of this report and that of the Publications Committee, presented by Chairman Enslow, follow. (The wording of the following paragraphs is an exact reproduction of the report of Secretary Jordan on the Board's actions.)

"The Water Purification Division was requested to appoint men from its membership to act as referees in the revision of the text of the Manual of Water Quality and Treatment and in the preparation of Specifications and Methods of Test for Water Purification Chemicals.

"Appointment of Committees on Specifications for Reinforced Concrete Pipe; on Hydrants; and on Valves was approved. The first Committee will have as its immediate task the preparation of a Tentative

Standard on Pre-stressed Concrete Pipe to be added to the existing list of specifications on reinforced concrete pipe. The Committee on Hydrants and the Committee on Valves will have the duty of revising the current A. W. W. A. subject specifications.

"The Board approved the reactivation of the Committees on Laying Cast-Iron Pipe and on Distribution System Safety, each committee to be charged with the task of revising the current Association document on the subject matter.

"The Board approved a communication to the American Society for Testing Materials suggesting that specifications of that organization relating to steel pipe in sizes which might be used for transmission and distribution of public water supply, hereafter carry, at a proper point in the text, a clause which would indicate that the A. S. T. M. Specifications are not intended for use in the purchase of pipe to be used for the transmission and distribution of public water supply. This attitude is based upon the fact that A. W. W. A. has issued specifications for steel pipe exclusively for use in the transmission and distribution of public water supply.

"The Board approved the filing with the U. S. Bureau of Standards of objections to the proposal to embody in the Federal Specifications for Valves (which might be used for water distribution) the current W. P. B. limitations on valves. This objection is based upon the opinion that certain refinements in valve structure, which have been set aside by the W. P. B. wartime order, are necessary to valves intended for long term and satisfactory service and may endanger water supply operations where the restricted type of valve is used."

Special Committee on Depreciation

The Board approved the following appointments by President Morris to a new Committee on Depreciation: L. R. Howson, Chairman, C. J. Alfke, John S. Longwell, Dale L. Maffitt, H. A. Van Norman, N. T. Veatch, Jr., Abel Wolman.

This committee was appointed so that prompt action by the Association might be taken in the interest of water utilities in the matter of a pending report of the Committee on Depreciation of the National Association of Railroad and Utilities Commissioners. This new committee will in a measure also supplement the work of the A. W. W. A. Committee on Survival and Retirement Experience with Water Works facilities.

Membership Growth Largest in A.W.W.A. History

With considerable pleasure the Board heard from Secretary Jordan (the real reason in our judgment) that during 1943 the Association experienced the largest annual gain in members in its history. After dropping all "dead-wood" for non-payment of dues in December, at the year's end the 4,970 "live members" represented a *net* gain of 529 members for the year. This compares with 4,441 members on July 1, 1943, and may we add that member pick-up in January of this year 1944 has put the membership above the 5,000 mark. When Secretary Jordan assumed charge for A. W. W. A. in 1936 (December) the membership stood at but 200 or so of being just one-half its present figure.

Milwaukee Conference Assured

The 1944 A. W. W. A. Conference scheduled for Milwaukee June 13-16 inclusive, is now assured.

In this direction the closing hour of the Board's meeting was devoted to a preview of topics and committee meetings on the calendar for the Milwaukee Conference. These several items were presented for the Board's information, discussion and evaluation as to relative desirability by Linn H. Enslow, Chairman of the Committee on Publications and Technical Programs.

W.P.B. EASES RESTRICTIONS ON WATER UTILITIES

U-1 Order Revised and Simplified. Small Plants to Benefit from Easements

Copper Tubing Released

On Jan. 24, 1944, WPB reissued its Limitation Order M-9-c-4 as amended on that date. The principal change in the order was to release frozen inventories of copper and copper base alloy pipe, tubing and fittings now in the hands of utilities. That portion of the amended order which released the copper tubing reads:

"Copper or copper base alloy pipe, tubing or fittings in the inventory of a water or gas utility on Jan. 1, 1944, may be connected to a water supply or water distribution system or any underground gas supply or gas distribution system, if the pipe, tubing or fittings are to be used both underground and outside of a building."

[From a reliable source we are also informed that in specific instances, where copper tubing for water services can be shown to be preferable to alternate materials on grounds of corrosion resistance or health aspects, WPB will now even permit purchase of new copper tubing.]

Order U-1 was revised and issued in amended form on Jan. 22, 1944. With the amended order was issued an administrative letter from J. A. Krug, Director of the Office of War Utilities. A copy of the administrative letter with the amended order, should be received by all water utilities. In it Mr. Krug explains the principal changes in the order. Of particular interest is the simplification of procedures, and regulations in the purchase and use of materials for maintenance, repair and operating supplies and for minor plant additions.

Changes in Definitions

In addition to rearrangement and rewording to improve clarity the order now defines "minor" and "major" plant additions. "Operating supplies" now are material, other than fuel and chemicals, used in operations other than maintenance, repair or additions. "Maintenance" and "repair" have been defined so that these terms are applicable only

to jobs which do not involve plant additions.

Limiting Dollar Value

"The limiting dollar value is set at a flat $1,500 instead of the former limits of $500 for overhead and $1,500 for underground construction.

"The $1,500 limit is not applicable where existing facilities are replaced with facilities of equal or less capacity. Such work may be undertaken under Order U-1, without regard to dollar value of materials used, provided the restrictions are observed regarding major plant additions. If material must be purchased for the job, the dollar value must be included in quotas established for scheduled deliveries."

Extension of Lines to Consumer Premises

"In cases where the proposed minor plant addition is an extension of a line to a consumer, then the job must qualify under the provisions of the applicable amended supplementary order (U-1-a, U-1-d, etc.) or must have been specifically authorized on form WPB-2774."

Inventory Redefined

"The definition of inventory has been modified in order to emphasize that 'fuel' is not to be included in the inventory controls of U-1. Also specifically excluded from inventory are water purification and treatment material (except equipment), and gas chemical material. The term 'material incorporated in plant' means material physically incorporated in plant and ready for operation."

Assignment of Preference Rating

A change has been made in the assignment of preference ratings. This change avoids record-keeping, heretofore required with the "split rating" provisions. The following rules should be observed in obtaining material (other than controlled materials) for U-1 purposes.

1. Use the preference rating AA-1 for:

a. All material except that included in the "transmission and distribution" class of material.

b. "Transmission and distribution" class material when required to take care of actual *or imminent* breakdown of facilities.

2. Use preference rating AA-3 for all material in the "transmission and distribution" class except when the AA-1 rating is needed to assure prompt deliveries of materials for repairs in this class.

In the "transmission and distribution" class water utilities may use one-third the dollar value of material withdrawn during the last nine months of 1942 or 60 per cent of the dollar value of similar material withdrawn in the same quarter of 1940. This latter figure should be available because of its use as a base in restrictions imposed in the old P-46 order.

Delivery Schedules Made Flexible

Significant changes in Parts II, III, IV, and V include the following:

"Scheduled delivery" no longer includes material from a producers' own inventory or excess inventory of another utility.

Deliveries and inventory quotas now appear in Schedules B and C instead of in the body of the order.

Inventory Keeping Materially Simplified for Smaller Plants

For all plants with inventories of $10,000 or less it is no longer necessary to keep inventory records by classes.

Inventory restrictions are applicable only as a control on scheduling deliveries. There is no restriction on acceptance of delivery which may be in advance of date anticipated.

A utility may now purchase "short items" of material provided that purchases of the required items are planned as to quantity and delivery date so that no more than ninety days requirements are on hand at any time.

There are also several changes in regard to sales by utilities of non-controlled materials, used equipment and material from excess inventory if the value of the sale from excess inventory is less than $100.

Nearly all of these changes constitute easements of earlier restrictions and simplification of requirements.

Paul Hansen Passes

Well Known Water and Sewage Consultant Suffered Heart Attack

Paul Hansen

On February 6th in Chicago, Paul Hansen, well known water and sewage consultant, died as the result of a heart attack. He was 64 years old.

Paul Hansen was born in Arlington, Va., August 9, 1879, and was graduated by the Mass. Institute of Technology in 1903 as a B.S. in Sanitary Engineering. The first year of his successful professional career he spent in the employ of the Mass. State Dept. of Health and then went to Columbus, Ohio, to work on the new water and sewage treatment plants there. He thereafter became Chief Engineer for the Pittsburgh Filter Co. (1905) and then served for four years with the Ohio State Dept. of Health, first as Assistant and later Chief Engineer. In 1910 he went to Kentucky as State Sanitary Engineer and in 1911 was appointed Chief Engineer for the Illinois State Water Survey. Four years later he was made Chief Engineer for the State Board of Health of Illinois, and five years later (1920) was taken in as a member of the well known engineering firm, Pearse, Greeley and Hansen, which later became Greeley and Hansen upon Langdon Pearse's withdrawal to devote his full time to the Chicago Sanitary District work.

Paul Hansen served in World War I as field staff officer with General Pershing on water supply. His rank of Captain in World War I was the equivalent of about a Lieutenant-Colonelcy in the present war, and he is credited with some good work on Pershing's field staff as water supply officer.

Mr. Hansen was engaged in the design and construction of some of America's most important water and sewage projects, including those of New York City, Chicago, Buffalo, Boston, Washington, Toledo, Philadelphia and Peoria, and frequently served as expert witness in court cases and rate hearings. He was a member of at least a dozen of the leading technical societies and associations, before which he had presented many papers and reports. He was a member of Sigma Xi and Theta Xi fraternities, the Rotary Club of Chicago, and the Executives' Club of Chicago.

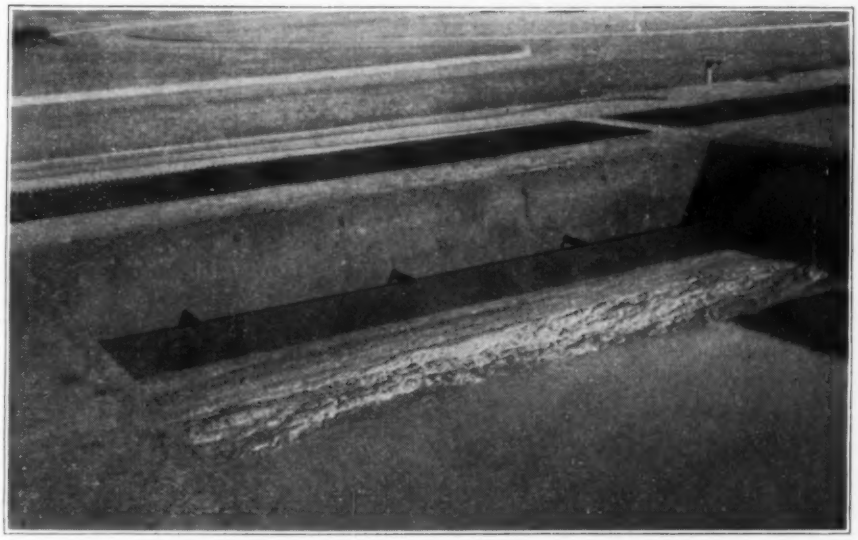
Paul Hansen married Allison May Scott in 1905 and had two children and five grandchildren, all of which survive him.

Other than this there is little to tell about Paul Hansen, except to say that he was capable, he was much liked by all and loved by many who enjoyed that certain Chris Kringle twinkle in his eye, and his dry humor, his sociabilities, and his consideration for all.

SOLVING PROBLEMS CAUSED BY OILS IN SEWAGE AT SPRINGFIELD, MASS.

By JOHN D. McDONALD
Superintendent
SEWAGE TREATMENT PLANT
SPRINGFIELD, MASS.

THE Main Sewage Treatment Plant for Springfield, Mass., is a primary treatment plant of 30 mgd design capacity serving a population of 160,000 persons and located on the Connecticut River. The treatment consists of coarse racks, grit removal, comminution of solids, aeration and sedimentation, with separate sludge digestion, vacuum filtration and incineration. The plant was constructed in 1939-40 and has been in continual operation since June, 1940. The average daily flow to date has been 18 mgd with a sewage strength averaging 475 ppm. total solids, 200 ppm. suspended solids and a 5 day B. O. D. of 180 ppm. Removals of suspended solids have averaged approximately 55 per cent and B. O. D. removals have averaged 35 per cent.



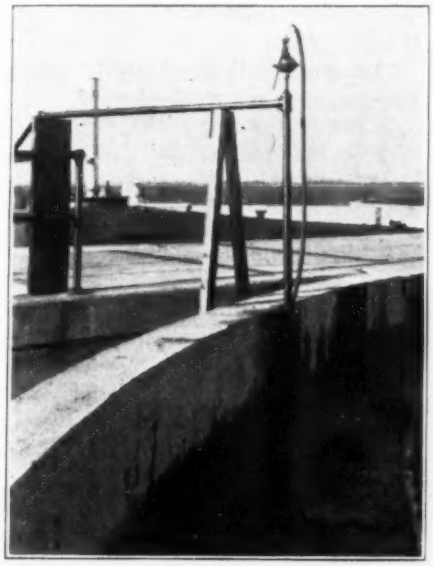
Portion of Sedimentation Tanks Showing Accumulation of Scum

Aside from normal minor operating problems, there were no major difficulties experienced during the first two years. In the fall of 1941, however, the scum layer in the digestors began to increase rapidly and soon reached an average depth of over six feet as shown by the monthly inventories of all digestors. In addition to a total solids increase in this scum, the volatile content increased rapidly. The depth of these scum layers often interfered with supernatant withdrawals as the scum was below the level of all drawoffs even with the floating covers in their highest positions. Whenever this condition was encountered, supernatant was withdrawn from the raw sludge inlet line, but, of course, this method was not satisfactory except as an emergency and the solids in the supernatant increased from 0.50 to over 1.50 per cent.

During this same period, the volatile content of the digested sludge increased from approximately 40.0 per cent to over 50.0 per cent with a corresponding increase in the use of a coagulant and a decrease in the life and efficiency of the filter cloths. The most serious difficulty, however, occurred in the incinerator operation where the high volatile content made temperatures difficult to control. The equipment being the flash drying type with burning in suspension, the possible sale of dried sludge was anticipated, and it was feared that this high grease content might be detrimental to its use as a fertilizer base.

Oil!

It was immediately apparent that all these difficulties were definitely from one source; namely, grease and oils, that is petroleum oils and greases, non-saponifiables. The laboratory analyses of the influent, effluent and sludges were studied and plans made to combat and correct this condition. The first operation was to put the four digestors into good operating condition. This was done by taking most of the bottom sludge from the digestor which had the greatest scum layer and distributing this sludge about the other three tanks. All supernatant liquor was removed, leaving the one digestor with its contents consisting only of about seven feet of scum.



Piping to Digestion Tank Seal with Diaphragm Pump to Start Siphon

The scum layers from the other three digestors were then pumped into the first tank, resulting in one tank filled with scum and three tanks in good working order. To keep these tanks free from further excessive scum layers, the daily accumulations of skimmings were pumped solely to the scum digestor and not distributed to the other three with the raw sludge. For nearly two years, this system has functioned with some very interesting results.

The next step was an attempt to reduce or curtail the quantities of petroleum coming to the plant. Analyses showed an average of 72 ppm. of ether soluble in the influent and 32 ppm. in the effluent. The greater portion of this removal was in the form of skimmings manually removed from the primary settling tanks. These skimmings were aver-

1,000 Gallon Tank to Receive Oil from Digestion Tank

aging 2100 gallons per day with a total solids content of 35.0 per cent. Of these total solids, 82 per cent was ether soluble material of which 94 per cent was non-saponifiable.

From a survey of the sewerage system which was being carried on simultaneously with the laboratory studies, several obvious offending plants and garages were uncovered. It was decided that although there were ordinances prohibiting these practices of discharging crankcase drainings, cutting oils and other inflammables into the system, the better way to handle the problem would be a program of education and cooperation.

Attack on Problem Through Press

The local press was contacted and readily ran several articles in which stress was placed on the value of the wasted oils and the detrimental effects on the sewage treatment process. These articles bore fruit at once, in that the owners of two large local laundries contacted the sewage plant for more information on how they could get this oil, with a view of salvage for fuel purposes. It was explained to them that the oil was not in any usable form when it reached the plant but that if it was salvaged prior to being discharged into the sewers, a source of economical fuel might be uncovered.

In an informal and unofficial manner, these two gentlemen were put in touch with the management of several of the suspected locations. It developed that most of the offenses were committed entirely without the knowledge of the management or by small plants and garages, each feeling that its small quantity would do no harm. When the whole picture was explained, hearty cooperation was promised in every case. These persons interested in buying the oil then obtained two oil trucks and made agreements with numerous garages, service stations and factories to collect their waste oils regularly and pay a nominal price for the oil; this price varying from one cent to two cents per gallon, depending upon the quantity at the pickup point. Small service stations were loaned drums in which to put the crankcase drainings and were satisfied just to have the place kept clean. One of these laundries is now collecting in the vicinity of 4000 gallons per week. This provides for about two-thirds of their fuel requirements, the remainder being made up by coal pending the increase in the salvage collection system. In addition to any financial benefits, these persons can definitely feel that they have contributed to the war effort in making their normal fuel quota available for other use and in partially easing a difficult situation for the sewage treatment plant.

Cooperation with Industry

One of the most outstanding examples of cooperation came from the officials of one of the largest industrial plants in the vicinity. These officials were apprised of the fact that large quantities of oil were being discharged from their plant and expressed their incredulity when confronted with the estimated quantity. They assigned their engineer to investigate and the result was a change-over of one of their two boilers to oil, and for the past nine months that power plant has operated on the 200 gallons of oil per day that formerly was carelessly wasted to become a "headache" at the sewage plant.

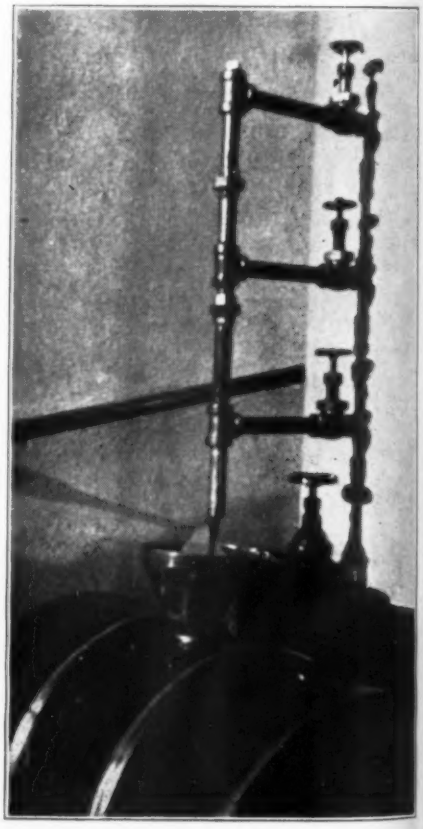
The problem is not entirely solved nor probably will it ever be, but recent sewage analyses show that the ether solubles are down to 40 ppm. in the influent and 15 ppm. in the effluent. The skimmings still average about 32.0 per cent dry solids of which 78.0 per cent are ether soluble, but the non-saponifiable content is down to 58.0 per cent. This is definitely a trend in the right direction.

These skimmings are still segregated in the digestor reserved for scum. Good digestion has continued in this tank and the gas production per pound of solids added has remained about the same in this tank as in the other three normal tanks. The digestor temperature has been maintained at 95°F., the pH too remained at 7.6-7.8 with an alkalinity of about 3200 ppm. without the addition of any lime. As the saponifiable fats and other organic materials digest in this tank, the resulting accumulations of various other oils formed a deep but very fluid sort of scum.

Oil Recovery

This oil lies in a layer about four feet thick just below the floating cover and has filled the seal opening between the cover and the tank. Samples of this oil showed it to have virtually the same properties as a No. 5 fuel oil. This led to experiments with a view toward salvage as eventually it had to be disposed of.

A tank from a discarded sprinkling cart was set up adjacent to the digestor and a piping system from the digestor cover seal to the tank put in. A hand operated diaphragm pump was put into the line to remove air and, once started, the oil accumulation syphons into the oil tank. Here it is allowed to settle overnight and then a good grade of No. 5 fuel oil is drawn off as required. Three one-inch drawoffs have been provided at different levels and a large two-inch drain is at the bottom to draw out any water or sludge. The oil is strained through a 40-



Oil Being Drawn from Tank Into Drum for Use as Fuel

mesh screen before being put into the tank.

This oil is used by the Department in a burner normally using No. 5 oil, with no changes or adjustments. Approximately 5000 gallons have been used to date with no apparent difficulty. The following is a tabulation of the average analysis of over a dozen samples of this oil removed from the scum digestor during the past year, as compared to the A.S.T.M. standards for No. 5 fuel oil:

	No. 5	Digestor Oil
Furol viscosity at 77°F.	20-35 sec.	31 sec.
Flash point	Min. 150°F.	275°F.
Water and sediment	Max. 1.0%	1.5%

On distillation tests as compared to the No. 5 oil normally purchased:

Initial boiling point	406°F.	400°F.
10% distilled	530°F.	526°F.
50% distilled	700°F.	705°F.
85% distilled	726°F.	720°F.

(Highest temp. run.)

No reason except coincidence can explain the similarity and it could be that the mixture may be unique to this city.

The advantage to removing oil from the seal is that it is practically free of water and solids, but in the event that the oil cannot be removed rapidly enough from the seal, experiments are now being made on the use of a cider press to separate liquids and solids in the digested scum. This has only been done on laboratory scale at this writing and may not be economically possible on plant size except from the viewpoint that the oil must eventually be removed by some means from the digestor. The digested scum is pressed and the resulting liquid is then centrifuged. The oil recovered by this method fits the same specifications as the other, but the high percentage of water, solids and other impurities in the pressed liquid points towards an expensive operation.

By leaving the scum in the tank for a natural segregation, there is a longer digestion period and the resulting oil is more free of contaminants. At present about 200 gallons per day are being taken out but some of this probably has been in the plant for over two years. It is hoped that as the surplus is used and the incoming quantity reduced, in the near future the oil problem at this plant will be eliminated.

WATER AND SEWAGE PATENTS

(OF RECENT ISSUE)

WATER PATENTS

FLUID METER. Alexander R. Whittaker (to PEMCO). U. S. 2,338,152. Jan. 4. Meter consisting of measuring chamber and cylinder with inlet and outlet and piston of oscillating type within the chamber.

METHOD OF TREATING WELLS. Lawrence H. Flett (to Allied Chem. and Dye Corp.) U. S. 2,338,282. Jan. 4. A process for acid treating water wells to increase flow, using an alkyl organic compound and sulfuric acid residue. Soluble salts are formed by the organic compound and calcerous deposits in and around the well cavity.

WELL PUMP. William E. Rembert. U. S. 2,338,300. Jan. 4. A well pump consisting of casing, tubing, pumping barrel, and sucker rod with special provision for water tight seal and for fluid to travel upward inside casing and outside of the tubing.

LIQUID METER. Robert S. Bassett (to Sylvia Bassett). U. S. 2,338,396. Jan. 4. A meter having a cylinder with inlet and discharge openings, and hollow reciprocating piston with slidable valve actuating rod and springs to shift valve.

FISH GUARD. James L. Brickley (one-fifth to C. A. Crawford, one-fifth to A. R. Kurtz). U. S. 2,338,487. Jan. 4. A fish guard for irrigating ditches, consisting of trough like body with rotary screening drum.

WATER CONDITIONING APPARATUS. Julius Felsch. U. S. 2,338,500. Jan. 4. A water treating tank, consisting of a closed tank with vertical baffles, and a cooling coil unit spaced between baffles.

FLUID METER. Alexander R. Whittaker (to Pittsburgh Equitable Meter Co.). U. S. 2,338,609. Jan. 4. A liquid meter providing a cylindrical meter chamber, an oscillating disc piston, top and bottom covers with ports providing passageway and angle connections whereby a plurality of pipe layouts may be connected to the meter.

WATER TREATMENT APPARATUS. Arthur L. Riche. U. S. 2,338,667. Jan. 4. A water softener tank with inlets for hard water and regenerating solution and valves to control flow for service, regeneration, and rinse, coupled with a light sensitive means for periodic testing of water for hardness with automatic regeneration, rinse and service controlled by light, sensitive means.

CLARIFICATION OF LIQUIDS. Irving E. Muskat (to Pittsburgh Plate Glass Co.). U. S. 2,338,958. Jan. 11. A method for removing suspended solids from aqueous solution by a flocculation agent composed of iron chloride admixed with from 0.5 to 20 per cent by weight of chromium chloride.

SEWAGE PATENTS

SCUM REMOVER. Frank G. Stuller (to Chain Belt Co.), U. S. 3,447,859, Dec. 28. A special conduit located across one end of a sedimentation chamber to receive and remove scum collecting in the chamber.

VENTURI METER. Gregory A. Petroe (to Mathieson Alkali Works), U. S. 2,337,921, Dec. 28. A venturi meter for measuring the flow of liquids carrying suspended solids.

SEWER TRAP. Everett J. Prescott. U. S. 2,339,110. Jan. 11. For installation in manholes having an outlet pipe and open sewage channel in the bottom of the manhole, a sewage trap to straddle the channel with adjustable members extending into the channel and arranged to trap large bodies while permitting sewage to flow.

LIQUID CLARIFICATION. Phillip M. McHugh and William C. Weber (to The Dorr Co.). U. S. 2,340,132. Jan. 25. A multiray clarifier containing superposed clarifying compartments, each having a peripheral wall with feed inlet port and mud outlet port, with means for withdrawing clarified effluent from each compartment, and provision for mud discharge.

COMPRESSED AIR SPEEDS PIPE CUTTING

By A. M. EDWARDS
Senior Engineer
DIVISION OF WATER
COLUMBUS, OHIO

In Columbus, Ohio, the Division of Water was faced with the problem of taking up and relaying about 4,500 lineal feet of 12 inch cast iron pipe, made necessary by a road relocation and improvement.

It was finally decided to cut the pipe about every 42 feet, raise and remove to the new location, a distance varying from 10 to 100 feet. feet.

Cutting operations were started by using a Strickler ratchet pipe cutter, operated from the top of the ditch, with four men working in relays of from 10 to 15 minutes. The time required for one cut on a 12 inch pipe by this method was approximately 2 hours, larger pipe required up to 3 hours.

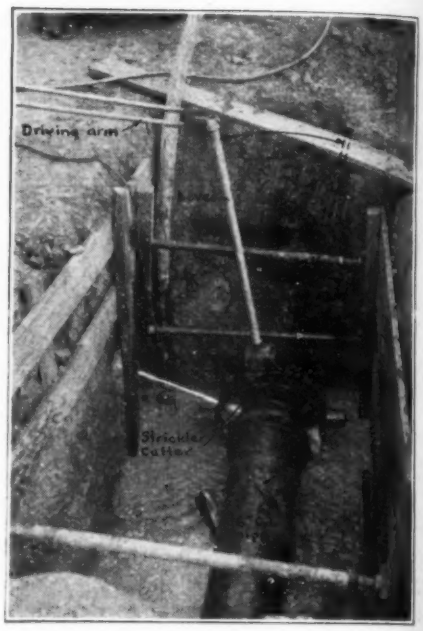
The sledge and diamond point method was tried but it was about as slow as the cutter—and, with the added danger of cracking the pipe.

While trying to think of some means to speed up the work, the writer conceived the idea of utilizing a pneumatic wrench as a power driving unit for the Strickler cutter. This was done by assembling a gear and pinion from a horizontal gate valve, with an arm extending from the gear crank pin to the hand lever on the Strickler ratchet cutter. This assembly was bolted to the rear of a service truck, and power was furnished by a 105 cfm portable air compressor through our Ingersoll-Rand No. 58 pneumatic wrench. The latter is ordinarily used for operating large valves.

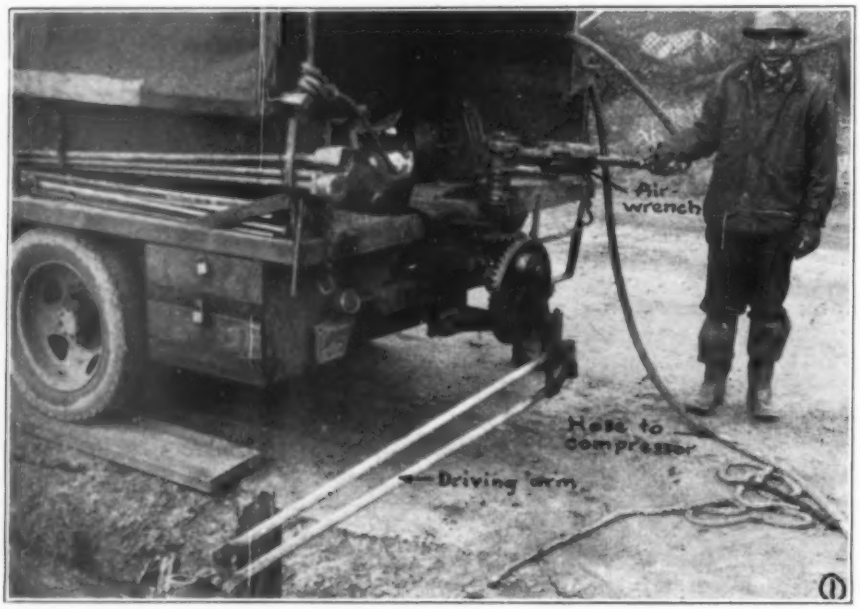
With this power assembly in place and ready to operate, the actual time for making a cut was approximately 17 minutes for a 12 inch pipe, with only one man to operate or control the apparatus. This 17 minutes compares with a cutting time of 2 hours for manual cutting, requiring four men working in relays.

This type of cutter automatically cuts cast iron, steel or wrought iron pipe from 1½ inches to 30 inches in diameter, either in trench or in shop.

The cutter blades make a channel cut around the pipe. The cutter assembly opens wide and is fastened by tightening one swing bolt. The ratchet head to which the hand lever is attached is equipped with dogs engaging teeth on the body of the machine which holds the star fed cutting blade. As the machine rotates around the pipe, the star feed sends the cutting tools in automatically.



The Air Driven Strickler Pipe Cutter in Action



I.-R. Pneumatic Wrench, Gate Valve Gear Assembly and Driving Arm

In photograph No. 1 the valve gear assembly is shown bolted to the rear of the truck, together with the driving arm and the air wrench in place, operated by one man. Ordinarily the air valve on the wrench is clamped in the open position and the wrench fastened to the truck, thus relieving the operator after the cutter has started.

In photograph No. 2, the Strickler cutter is shown in place on a 16 inch cast iron pipe. The approximate travel of the lever is shown by the dotted line.

The particular work we were doing in the accompanying photographs was in preparation for cleaning 1,800 feet of 16 inch pipe. The pipe is Class B and the actual cutting time was 30 minutes.

MISSOURI CONFERENCE IMPRESSIVE

Holds 19th Annual Meeting in Jeff. City; Enjoys Excellent Program; Feasts on Barbecued Chicken

(A DELAYED REPORT)

FOR a long time it has been Ye Ed's wish to attend one of the Missouri Water and Sewerage Conferences. Now that this wish has materialized and the 19th Annual Conference, held in Jefferson City on October 25th and 26th, 1943, was attended, the experience was both enjoyable and impressive. In fact we are already looking forward to the next opportunity to sit in on another of these Missouri Water and Sewerage Conferences.

To those Conference members who, with some justification, may have wondered why this report covering their meeting the latter part of October has not appeared in an earlier issue, we can only say that circumstances beyond our control have prevented it. The new limits on paper use, and an accumulation of reports covering earlier meetings, has made it necessary to print these reports in chronological order, while maintaining a fair ratio of space devoted to articles as well as meetings reports. With this explanation for the regrettably delayed report, we shall now proceed to try to do justice to the Conference.

Chairmen

Retiring
E. E. Wolfe
Chemist
Weldon Sprs., Mo.

Incoming
Roger Higgins
Chemist
Hannibal, Mo.

Sec'y-Treas.
W. A. Kramer
State Health Dept.
Jefferson City, Mo.

Vice-Chairman
John F. Sanders
Supt.
Boonville, Mo.

First, and foremost, was the excellence of the technical program, for which "Herb" Hartung of the St. Louis County Water Co. and his Program Committee deserve praise. To this reporter, a highlight was the annual dinner with Dr. James Stewart, State Health Commissioner, as principal speaker reviewing the growth of the Conference and resulting improvements in water works operation in Missouri. He made it plain that the Dept. of Health which had been sponsoring these Conferences appreciated the job done by its members, and the public should also.

And, a long to be remembered experience was that complimentary dinner of Chicken Barbecue served at the filter plant of the privately owned Capital City Water Co. This delectable repast was, in fact, produced under the personal supervision of our No. 1 host Walter Helmreich, Genl. Manager for the Company. An accompanying snapshot caught our host in the act of checking up on the barbecuing.

As to the technical sessions, the most impressive observation was the extent to which members entered into the discussions and asked questions from the floor—one of those things that make such meetings click. Then at the Annual Dinner a pleasing bit of entertainment took the form of a recitation of original verse by one of the Conference's Superintendents —Roscoe Howard of Slater, Mo., and we are privileged to be able to reproduce in coming issues some of the verses supplied by this "poet-laureate" of the Missouri Conference.

Honored
Hugh Brown
Supt. Sewerage
Vandalia, Mo.
(To him the 1943 Award of Merit)

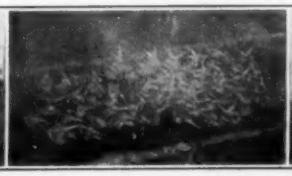
Bard
Roscoe R. Howard
Supt. of Water
Slater, Mo.
(Poet Laureate of the Mo. Conference)

Hugh Brown Honored

At the annual dinner the 1943 "Award of Merit" was presented to Hugh Brown, Supt. of Sewerage at Vandalia, Mo.—"For his interest in improving plant operation; for his

Opening Session
Chairman Frank Thierfelder, presiding; Major L. J. Murphy, U.S.P.H.S., speaking

Host
Walter Helmreich, Genl. Mgr., Capital City Water Co., supervises the barbecuing of chickens for the filter plant dinner



On the Fire
Barbecued chicken for all — without question the most delicious ever tasted. A real treat

Waiting the Call
Leonard Board, St. Louis County San. Engr; H. L. Williams and G. M. Young, State Health Dept. Engrs., Jeff. City

Head Table
Dinner Speaker— Dr. James Stewart, State Health Commissioner
At Table— Crane (Columbia); Brown (Vandalia); Higgins (Hannibal); Wolfe (University City); Hartung (St. Louis)

record Conference attendance, and his general efforts toward advancing the profession." Before becoming Supt. of Sewerage at Vandalia, Mr. Brown was Chief Operator at the Vandalia Water Plant.

New Officers

The following were named officers for the ensuing year:

President: Roger Higgins, Supt. of Water and Sewage Treatment, Hannibal, Mo.

Vice-President: John F. Sanders, Supt. of Water, Boonville, Mo.

Secy.-Treas.: Walter A. Kramer, Asst. Engr. Mo. State Dept. of Health, Jefferson City. (Mr. Kramer, re-elected, has long served as Secretary of the Conference and is in large measure responsible for its several advantages to members, including the distribution of a valuable "Operator's Notebook.")

Representing the Missouri Conference on the Sewage Works Federation Board of Control is Wm. Q. Kehr, Asst. Engr., Mo. State Dept. of Health.

Technical Sessions

(E. E. WOLFE, *Chairman*)

In presiding over the several technical sessions Chairman Wolfe was assisted by Frank Thierfelder, John Sanders, Herbert Hartung and George Loelkes.

The opening session was largely devoted to the interesting topic—

"How I Get Along with Less—or Without"

D. Elrow Crane, Supt. at Columbia, Mo., related how chlorine had been saved by aerating deep well-water to expel hydrogen sulphide. Thus the taste of the water was improved and 0.2 ppm. residual can now be maintained in the distribution system. Valves of the steam pumps are built up and reground in local machine shops. For smaller valves old stems from larger valves have been turned down and machined to fit. The steel plate casing of a forced draft fan had a hole repaired by a patch of cement in lieu of steel plate which was later obtained for a more permanent patch.

Wm. E. Ralls, Supt. of Utilities at Trenton, Mo., said that his town owed much to the shops of the Rock Island Railroad in the matter of "getting along with less." To put the valves of the distribution system in reliable condition he had secured spare parts for two valves of each size and make in the Trenton system. This, however, proved but a "drop in the bucket" when repairs got under way and a survey disclosed just 65 inoperative valves. Much machine shop work was required in lieu of new parts. For bits of copper tubing and other service line materials every nearby junk yard had been raided. A number of corporation cocks were found dust laden in a hardware store. While repairing valves adequate pits were installed.

"Wheel-Horses"

Fred Williams
Supt.
Water and Lights
Poplar Bluff, Mo.
(Chmn. Nominating Committee)

Herb. Hartung
Chemist
St. Louis County Water Co.
(Chmn. Program Committee)

In water treatment reducing chlorine dosage to the raw water resulted in tastes. This chlorine-saving operation necessitated many times the quantity of activated carbon previously required in producing palatable water.

Meyer Serkes, Asst. Engr. of Distribution, St. Louis, Mo., related the use of 6 in. pipe as the maximum service line to plants and 2 in. pre-caulked C.I. for the smaller commercial services. These lines were tapped with three ¾ in. corp. cocks connected through copper goosenecks. For joint making rope had replaced hemp and cement had been used. For curb boxes terra-cotta and concrete sewer pipe was used. Lacking Ys and ells, but having tees, the latter were made use of as substitutes.

Roscoe R. Howard, Supt. at Slater, Mo., related the up-hill fight to keep his community supplied through a long force main without benefit of intown storage. Fortunately the community is 100% metered, or the story might have been different. A storage tank of mil. gal. capacity is the first on the list of planned improvements.

Mr. Howard then related the proven value of transmission main cleaning at Slater, in which a method devised by himself of injecting compressed air into the pressure line during maximum pumping rates had been effective in descaling the line sufficiently to return a large per cent of its original capacity. Mr. Howard also related how "air-shooting" of wells had loosened up and removed flow impeding sands and boosted well yields. [Note: Mr. Howard has prepared a description of his air-purging schemes for early publication in this magazine. Nothing could well be more simple than this "air-shooting" and the scheme serves to give the needed results, regardless of the fact that a thorough mechanical cleaning might further boost the capacity of this long line. We understand that the Howard "spring tonic" is given his wells and mains at least yearly.]

W. J. McCarroll, Supt. of Utilities at Fulton, Mo., in being assigned the presentation of means of getting along on less gasoline, advocated curtailment of motor vehicle use and substitutions of bicycles

A. Cooley Hollowell
Badger Meters
Kansas City
and
Roger Higgins
Chemist
Hannibal, Mo.

Frank Naylor, Gen. Mgr.
Public Utilities
Marshall, Mo.
and
Henry Hayob, Supt.
Water & Sewerage
Marshall, Mo.

W. C. Bennett
and
J. T. McFarland
St. Louis
Sales Engineers
Calgon, Inc.

J. Grant Frye
Attorney
Cape Girardeau, Mo.
and
Vic. Weir, Supt.
St. Louis County Water, Co.

W. J. McCarroll, Supt.
Water, Lgt. & Sewerage
Fulton, Mo.
and
Otto Reynolds
Kansas City Mgr.
The Leadite Co.

where possible. Closely watched records of gasoline use is another aid, and careful checking of "T" ration coupons to see that these do not fall into hands outside of the city departments may reveal serious "leaks." Then, too, refrain from requiring service and sales calls by manufacturer's representatives wherever possble.

"What Shall I Say?"

Was the second topic on the program and designed to help operators with the public.

Leonard Board, Sanitary Engr., St. Louis County, outlined some fundamental ideas in developing talks on "Water" before local organizations. He pointed out that civilization has risen on improved water supply and sanitation—notably the history of Carthage, Rome and the U. S. A. which has the world's finest water supplies. The first public supply in America was that of erudite Boston which supply dates back to 1852. The importance of water supply is illustrated best in the present war—Honkong, Singapore, Naples. In the last named 5 days were required to re-establish a water supply and much suffering and many deaths were the result. From this slide into the history and shortcomings (if any) of the local supply. Avoid being technical, said Mr. Board, and speak from the viewpoint of water production being a manufacturing operation requiring the highest skills and reliability of those in charge of supplying a product always safe for even the tiniest babies of the community—always available and abundant.

At this point show the dangers of political interference in such an operation of first importance to a community. The audience may find it interesting to hear something of the compensation received for such responsible work as supplying pure and wholesome water, in comparison to some other salaries in the community.

Wm. T. Bailey, Supt. and Chief Engr., Kansas City Water Dept., answered the problem of "What to Tell the Complaining Customer." First and always said "Bill" Bailey the answer is simple—tell him the truth. [What followed in Mr. Bailey's well presented advice to water and sewage works operators must remain a blank for the time being. This because Mr. Bailey at our request has put his talk into an article scheduled for our next issue.—Ed.]

"A Well Goes Down—Straight and True"

Was the title of a very fine movie in techni-color, shown by L. M. Heckman for the Layne-Western Co. of Kansas City. Impressive was the scientific laboratory control in the course of drilling and development of the Layne Gravel Pack Well. Also pictured was the production and testing of pumps, screens, casings, etc., in three large Layne factories, in which every bit of equipment used in Layne well installations is produced.

Post-War Planning

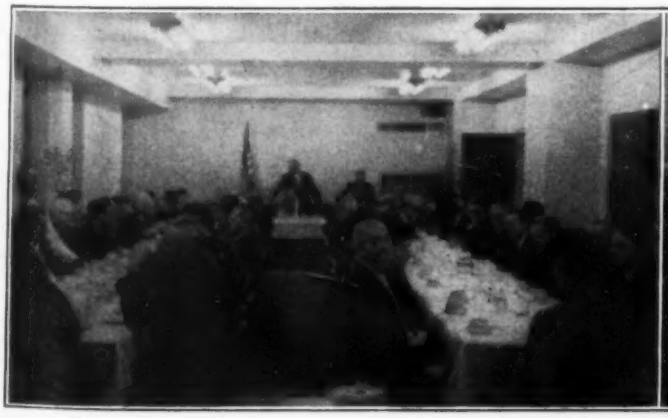
Was discussed by E. C. Wagner, of Jefferson City, representing the Associated General Contractors and the Post-war Construction Council of Missouri. Mr. Wagner outlined the make-up and programs of Local Citizens' Planning Committees in Missouri and advised water works and sewerage managers that, in making plans for post-war projects and looking ahead to where funds would be coming from, they could call on the Citizens Public Works Committee for aid. The guiding policies of the State Post-war Construction Council called for (1) useful projects only; (2) complete plans in readiness to go; (3) payment with municipal funds wholly to save loss and regimentation by federal bureaus if receiving federal aid.

Business Session and Operator Licensing

Reporting in the Business Session,

Programmers

Geo. L. Loelkes	*L. M. Heckman*	*Wm. E. Ralls*	*Harry Schlenz*	*D. Elrow Crane*
Sewage Wks. Engr.	*Engineer*	*Supt.*	*Sales Manager*	*Supt.*
St. Louis County Health Dept.	*Lane Western Co. Kansas City*	*Pub. Utilities Trenton, Mo.*	*"P.F.T." Chicago*	*Pub. Utilities Columbia, Mo.*



Annual Dinner

One of the Sessions

Secretary Kramer reported a membership of 258 in the Missouri Conference, consisting of 82 per cent superintendents and operators of water and sewage plants, and $1,017 in the treasury. The Conference finances a quarterly Journal, partially supported by advertising.

Programmers

W. Victor Weir
Supt. & Engr.
St. Louis County
Water Co.

Wm. T. Bailey
Supt. & Engr.
Kansas City
Water Dept.

In reporting on operator licensing in Missouri, Mr. Kramer stated that it had met with success, 69 operators now being licensed. Two operator short schools per year were being planned for holding at the University, with some credits allowed for courses by correspondence. Mr. Kramer exhibited a handsome looseleaf operator's notebook which had been issued to Conference members by the State Health Department at no charge. These notebooks cost $1.25 each in quantities and carried material of reference nature for plant operators and superintendents.

Speaking in favor of Operator Licensing, Supt. W. E. Ralls of Trenton told of its value to the Trenton system. All of his operators had been advised that if they could not pass the licensing tests they would be considered unfitted for their jobs. Some failed the first examination and were warned that a second failure meant dismissal, but every chance within reason would be given the unlicensed man. Rates of pay to Trenton operators would be based on grade of license held.

More Movies Shown

The remarkable color movie of the construction of "Big Inch" oil line from the southwest to the Atlantic seaboard was shown by the Barrett Co., and a movie showing the construction of "Pre-stressed Concrete Tanks" was shown by the Preload Concrete Co.

Sewerage Sessions

(Geo. Loelkes Presiding)

"Operation and Beautification of the Vandalia Treatment Plants," by August Little, Supt., Public Works, and Hugh Brown, Supt. of Sewerage, Vandalia.

This paper described Vandalia's activated sludge plant equipped with the Simplex Aerators and placed in service December, 1939, when Water, Sewage and Light were consolidated into a single Dept. of Utilities. Recent improvements at the plant, now treating 160,000 gal. per day, included a Fordaire Air Compressor and portable centrifugal pump and Rex sludge pump. Grit chambers have been added and the grounds beautified. Fuse type switches had been replaced with the new type magnet heater coil switches. By change of impeller and higher speed a sludge pump had been increased from 50 gal./min. to 200 gal./min. Roller bearings in one aerator had been replaced after 15 years of essentially continuous operation.

In the discussion Garvin Dyer of Springfield, Mo., stated that once a plant is beautified, its upkeep is no more work or expense than keeping down weeds. Roscoe Howard, Supt. at Slater, regretting that the public just thinks of a sewage plant as a necessary evil, felt that sewer rental was the proper thing to get the public more interested in this important utility. Frank Naylor, Gen. Mgr. of Marshall, Mo., related how watermelon growing at the local sewage plant had been the means of getting the local council interested in the Marshall plant. He recommended this method highly.

"Effects of Pollution on Stream Biology" was discussed by Paul Barnickal, Mo. Dept. of Conservation, who pictured the indices of pollution and the self-recovery of polluted streams. As to fish life, carp and buffalo could stand only 2 p.p.m. dissolved oxygen, whereas for mixed fish fauna the lower limit was 5 p.p.m., and for trout and dog-fish 8 p.p.m. in sewage disposal by way of fish ponds, Mr. Barnickol stated that a pond 8 ft. deep and not less than ¼ acre in size constituted the minimum size.

Mayor

R. J. Roper
Mayor
and Genl. Supt.
Sugar Creek, Mo.

Director*

W. Q. Kehr
Asst. Engr.
State Health Dept.
Jefferson City

**Member Sewage Wks. Federation Board of Control.*

Answering questions, Mr. Barnickol stated that algae growths have never been known to be toxic to human beings and that the best control was prevention. To control algae in shallow areas, the water primrose was the favored growth, reaching out 4 to 5 ft. from the shore line.

"Operating Separate Sludge Digestion Units" was the topic ably presented by Harry E. Schlenz, Vice-President of the Pacific Flush Tank Co., Chicago. In operating digesters, Mr. Schlenz did not favor the sequence method of adding sludge to a

Roger Pratt
W. & T. Co.
Kansas City
and
Joseph Charles
Filter Operator
Fulton, Mo.

Paul Worsham
Supt. Sewage Treatment
Fulton, Mo.
and
Harold T. Kiefer
Kansas City Office
Neptune Meter Co.

Vic Weir
St. Louis Co. Water Co.
and
Paul Barnickol
Mo. Conservation Comm.
Jefferson City

R. R. Hanson
Engineer
and
B. F. Bliss
Genl. Manager
Independence Mo.
Water Co.

Wm. Burdick
Chemist
and
Garvin Dyer
Secy. & Asst. Supt.
Springfield, Mo.
Water Co.

different tank each day. Preferable by far was the procedure of as frequent sludge additions to digesters as proves permissible. This practice keeps digesters on an "even keel" with more steady performance resulting. A temperature maintained between 80 and 95 degrees F. appeared optimum, although some plants had favored 100 degrees F. as the best overall temperature. The limit of heating coil water temperature was 135 degrees F., and heating with live steam had proved better than attempting higher coil temperatures.

As to sludge pH values as an operating indicator, Mr. Schlenz stated that in most cases the total alkalinity was a safer index, as was the volatile acid determination. In starting a digester, seeding with old sludge proved of too limited value to justify the trouble. Filling the tank with raw sewage and bringing up to 80 to 90 degrees F and adjustment of alkalinity through lime additions was recommended as the starting procedure. Good gas production should set in after a month and foaming not experienced. What *not* to do was to begin with a cold tank and feed it during cold weather.

Mr. Schlenz then described the Controlled Digestion System offered by his company and involving ample piping connections for flexibility and interchange between digesters. Recirculation of supernatant liquor sprayed over the scum blanket was advocated in preference to sludge recirculation. Recent experiences were proving the value of the addition of sulphate of ammonia as a digestion speeding measure and a method of holding down scum production. The ratio used was about 40 p.p.m. nitrogen calculated for one-half the tank capacity. In addition to scum reduction, marked increases in gas production ensued and reductions of volatiles in the finished sludge. (This method being so new, Mr. Schlenz refrained from giving exact data, the publication of which will come in due time.—Ed.)

Believed to be the best control index, the volatile acids titration was recommended as routine. When rising above 2,000 p.p.m., the operator can know that he is facing subsequent foaming or other troubles unless he diverts some of the solids loading.

The supernatant liquor problem has been long a problem and a continuous bleeding off of supernatant results in the most solids free liquor which may be improved by chemical precipitation and aeration before return to the sewage flow or disposal on sand beds or in lagoons. For such continuous even flow withdrawal P.F.T. has designed an ingenious supernatant selector now giving satisfactory results at 18 treatment plants and eliminating many valves and outlet pipes.

The P.F.T. scheme of treating supernatant as a continuous operation involves atomized aeration followed by one hour of quiescent settling to separate the gas freed solids. Supernatant under this method is no stronger than the crude sewage and the effluent quality varies but little, regardless of the quality of supernatant.

C. J. Vogelbein, Treas., St. Johns-Overland Sanitary Distr., St. Louis Co. — *Wm. B. Lamar*, Chief Engr Water & Light, Poplar Bluff, Mo. — *John W. Gavin*, Town Clerk, Sugar Creek, Mo. — *Vester Opie*, Plant Engr. Water Dept., Paris, Mo. — *F. M. Veatch*, Black & Veatch Engrs., Kansas City

Frye in Action

J. Grant Frye, City Attorney of Illmo, Mo., America's No. 1 Tank Repair Racket Buster in Action

In reply to questions, Mr. Schlenz considered genuine wrought iron pipe connected with Dresser type flexible couplings about the most satisfactory design. Neither aluminum nor copper tubing had proved practical. As to cathodic protection against digester corrosion, he could not give an opinion because of lack of experience with the method.

Session on War Restrictions

(HERBERT HARTUNG, *Presiding*)

"The War Situation in Chemicals," was reviewed by O. A. Collins of Barada & Page, Inc., Kansas City. Mr. Collins reminded water and sewage works operators that they were enjoying the highest priority on chlorine and hypochlorites, but it remained highly important to place orders prior to the 5th of the month preceding that in which deliveries of chlorine or hypochlorites would be required. The producers *must* know the demands for chlorine well ahead in order to allocate the supply produced. The chief difficulty remained that of supply of steel cylinders. Unfortunately not all operators had been keeping up the prompt return of empty cylinders. This situation is to the disadvantage of other chlorine users who may have to wait the availability of returned cylinders before their order can be filled. The high test hypochlorites, such as "H.T.H.," "Perchloron" and "Hoodchlor," can still be had if the purchaser certifies "For Sanitation Use Only" on the order.

Copper Sulphate continued tight and the user is still limited to 1500 lbs. per quarter. Also W.P.B. forms,

W. K. Rodman, Dist. Engr. State Dept. Health, Salem, Mo.

E. E. Scott, Sanitarian, Houston, Mo.

Grover Keeney, Supt., Houston, Mo.

Walter L. Shields, Supt. Water & Lights, Fayette, Mo.

Francis Thurman, Supt. Filtr.

Harry C. Brown, Supt. Parks, Fayette, Mo.

F. L. Thierfelder, Supt. Water & Lights, Macon, Ill.

C. W. Nold, Supt. Water, Lights, Sewerage, Freeburg, Ill.

R. L. Casey, Hall Elec. Co., St. Louis

with orders, must be filed 30 days in advance of requirement date. Filter Alum of wartime grade is not restricted, but shipments are even now as much as 4 weeks behind delivery dates specified. Soda Ash and Caustic Soda seemingly are to get tighter. Activated Carbon continues free and easy and except for the transportation bottleneck should continue so.

Anhydrous Ammonia and Sulphate of Ammonia have never been restricted as long as the purchaser certifies that such are not to be used in fertilizer. The cylinder situation is the one bottleneck in ammonia deliveries and empties are always needed as promptly as possible.

L. H. Enslow, speaking for The Chlorine Institute, stated that there was ample chlorine now for all legitimate uses in water and sewage treatment. Authorities who may have been holding back on chlorine uses, where additional quantities could be used to advantage, could now obtain more without feeling unpatriotic in the matter. Mr. Enslow also pleaded for the quickest possible release (return) of empty cylinders, even one at a time, to speed up the turnover. He said that if a few pounds remained in the cylinders returned the customer would be credited with the amount, and gladly so rather than to unduly delay returns. Mr. Collins, as a supplier, confirmed this statement.

"The Chlorinating Equipment Situation" was reviewed by Roger Pratt, District Mgr., Wallace and Tiernan Co., Kansas City.

Mr. Pratt informed his listeners that the Kansas City office and all other district offices of W. & T. maintain a liberal stock of emergency chlorinating equipment. Under W.P.B. restrictions any order amounting to more than $500 must go through the Office of War Utilities for approval. However, when the required equipment is for emergency use or to avoid pending imminent breakdown, an emergency order can be accepted by the manufacturer and authorization from O.W.U. obtained thereafter. This usually consists of prompt notification of the Water Division of O.W.U. in Washington that the emergency order has been placed and requesting authorization and assistance in securing rush shipment.

In reply to questions Mr. Pratt stated that for swimming pools chlorinators were only obtainable at present for the Army, the Navy and those colleges training Army and Navy personnel. Replacement parts for chlorinating equipment could be had under the authority given in the W.P.B. Order U-1 for maintenance and repair materials—AA3 for ordinary and AA1 for emergency.

"O.W.U. Orders and Other W.P.B. Restrictions" were reviewed and discussed in an interesting manner by the team of Victor Weir, Supt. of the St. Louis County Water Co. and Harvey Stephenson, W.P.B. Regional Engr. in the St. Louis Regional Area.

Mr. Weir, representing the Utility Group, had framed a series of questions which Mr. Stephenson had in advance and came prepared to answer for the benefit of all concerned. A matter of chief interest was the workings of the Regional Inventory Control scheme in which Mr. Stephenson stated that one utility selling from surplus inventory to another could charge no more than book value of the material or equipment plus 10%. One member trying to locate transformers through the Inventory Control Office found only old and unwanted types offered. On the other side Mr. Weir reported excellent results in disposing of thousands of dollars of surplus fittings from his stock and securing a number of wanted bronze cased meters.

The following are some of the answers by Mr. Stephenson to questions:

The water utility can purchase meters for consumers and can install meter boxes for the consumer under the AA-3 rating.

For main extensions and services the $1500 value limits on materials applies to the total requirement, even though the consumer should supply all or a goodly part of the whole. In service replacements it is a rule that neither the material nor the size of piping can be improved in the replacement. A water utility selling materials to consumers automatically falls under jobbers' regulations and a user priority must be secured for any item above $5.00 in value—see W.P.B. Order P. 84. If the use is essential an AA-5 priority is obtainable direct or by the utility. W.P.B.'s interpretation of an extension is piping straight through to the consumer's house or factory—i.e., the service line on the consumer's property is included. In any instance where materials required for any purpose may be thought to exceed the U-1 order limitations it is safer practice to make special application for authorization. If properly explained the circumstances usually permit liberalizations and approval.

In the matter of extensions the use of the smallest permissible pipe will permit extensions of considerably greater length—and so long as the $1500 limitation is not exceeded the length of extension is no longer limited except as to the more critical materials—not cast-iron or cement asbestos pipe. Many times 1¼ or 2 inch cement lined C.I. pipe will give all the flow and pressure required. Replacements can, of course, be made after victory.

There was considerable discussion over the frozen copper tubing situation and dangers of its capture for salvage prices. However, the January Amendment to the M-9-C-4 order clears this situation and makes reporting unnecessary.

The Tank Repair Racket

Readers of *Water Works and Sewerage* will need no introduction to J. Grant Frye, Cape Girardeau Attorney, who came to repeat his performance before A.W.W.A. at its 1943 Wartime Conference. He told again the story of Illmo, Mo., and the fate of tank repair racketeers who were adjudged guilty in the U. S. Courts and ordered to pay Illmo $10,000 in punitive damages on top of the $4,000 actual damages instead of collecting the $3,000 bill rendered for repairs to Illinois Elevated Steel Tank. Space limitations prevent us from repeating the details. These are worth reading though, and are all to be found in the A.W.W.A. Conference Report on pages 251 and 252 of our July 1943 number. If you haven't read this fire-eating attorney's account and the warning to small towns therewith—make it a point to do so.

With Regrets!

We shall not be able to report the following talks made at the Jefferson City Conference: "The Responsibility of Protecting of Water and Sewage Works," by Lindon J. Murphy, Sanitary Engr. U.S.P.H.S. and Major in the O.C.D. "Relationship of Fluorine to Dental Health," by Dr. O. A. Gruebbel, Mo. State Dept. of Health. "U.S.P.H.S. Standards for Drinking Water," by W. Scott Johnson, Chief Engr., Mo. State Dept. of Health, and discussions by Major O. C. Hopkins, U.S.P.H.S.

MEETINGS OF NYSSWA AND ASCE SANITARY DIVISION

A Report by
GEORGE E. SYMONS
Associate Editor

THE third week of January has become more and more crowded with technical sessions and business meetings of associations in the field of sanitary science. This year the Board of Directors of AWWA met; the N. Y. Section of AWWA held its mid-winter luncheon meeting; the N. Y. State Sew. Works Assoc. and the Sanitary Div. of the ASCE held their usual technical sessions and joint dinner, while other divisions of ASCE were also meeting. The advantages of all these meetings in one week are obvious and the attendance at all appeared to be bolstered by the combination.

N.Y.S.S.W.A. Program Participants

Dr. A. E. Berry
Chief Engr.
Ont. Dept. Hlth.
Toronto

F. M. Dawson
Dean of Eng.
Univ. Iowa
Iowa City

W. Donaldson
Chief
Bur. Sewage
N. Y. City

Dr. G. E. Symons
Assoc. Ed.
W. W. & S.
N. Y. City

H. E. Schlenz
Vice Pres.
"P.F.T."
Chicago

Sanitary Div. of ASCE

To succeed Mr. Clinton Decker as Chairman of the Division, the executive committee elected Mr. Ray F. Goudey, of Los Angeles, Cal. And as secretary, George J. Schroepfer of Minneapolis was chosen as Mr. Goudey's successor. The new members elected to the executive committee was Harry M. Freeburn, Chief Engr. of the Phila. Suburban Water Co.

At the technical session an item of particular interest was the Report of the Committee on Sewerage and Sewage Treatment, presented by the Chairman, Mr. Langdon Pearse, San. Engr. of the Sanitary District of Chicago. The report includes comments on over fifty subjects, but Mr. Pearse gave only a few of the highlights. Particularly mentioned was the grease problem and attempts to solve it in Chicago and New York by recovering scum for sale to reclaiming plants. Mr. Pearse emphasized other items as well, noting that some form of step aeration or incremental aerator loading had been introduced with considerable success under certain conditions, and that the "vacuator" for removal of scum had likewise proved successful. On the other hand, the Guggenheim process had reached a stalemate and no recent information on it was available.

A few other comments from the report were: The Hays process had not proved efficient in several Army camps and no new Hays plants were being installed at military posts. Magnetite filters are doubtful, having been discarded at one plant after several years because of mechanical difficulties and cost of operation. Garbage disposal with sewage is on the shelf during the war. In general, the idea is not sound and will not find application on any large scale. Sludge fertilizer has reached a good value during the war but the price for organics will undoubtedly fall after the war. Health hazards caused by cysts in sewage sludge are not present in heat dried sludge. Copper bearing industrial wastes in sewage had proved to interfere with sludge digestion at several plants as a war consequence. The patent problem still exists in the sewage field with much confusion. The life of many patents is extended by patenting some newly added feature of the process or equipment. Best information on patent law for the layman is a small volume by Biesterfeld, "Patent Law for Chemists and Engineers." Although poliomyelitis virus had been found in sewage, the disease has not been traced to sewage as the source; in fact its mode of transmission is still unknown and epidemiological evidence points away from water supply or sewage as sources of infection.

New York City Ready With Sewage Projects

Richard H. Gould, Director, Division of Engineering, Dept. of Public Works, New York City, in his discussion of post-war sanitary engineering work for the City of New York, outlined a program involving the construction of seven additional plants with their intercepting sewers to treat 705 m.g.d. sewage at an estimated cost of approximately $82,000,000. The completion of the program, the design of which is advancing rapidly, would increase the sewage treated from approximately 40 per cent at present to approximately 85 per cent of the total estimated sewage load of the city.

Most interesting among the new developments in the Bureau of Sewage Disposal will be the adoption at the Rockaway Plant of the principles of "Modified Sewage Aeration" that have been developed in the Bureau as a result of experimental plant operation and through full scale operation in three of the present plants. This method is quite similar to activated sludge in operation except that the solids in the aeration tank are kept at a controlled figure in the low solids range and the aeration period is greatly abbreviated. The purification effected

Joint Annual Dinner, Sanitary Engineering Division

Head Tablers (from left)—Geo. J. Schroepfer, Sec'y., San. Div., A.S.C.E.; Dr. A. E. Berry, Vice-Pres., Sewage Master-of-Ceremonies; Malcolm Pirnie, President of A.S.C.E.; Clinton Decker, Retiring Chairman, San. Div., A.S.C.E.; Federation; Prof. Gordon M. Fair, Exec. Comm., San. Div.; Geo. E. Symons, Vice-President, N.Y.S.S.W.A.; Homer

ASCE, and N. Y. State Sewage Works Association

Works Federation; Wm. H. Larkin and E. J. Smith, Incoming and Retiring Presidents, N.Y.S.S.W.A.; Wm. J. Orchard, Ed. J. Cleary, Guest Speaker; George Seabury, Exec. Sec'y, A.S.C.E.; A. M. Rawn, President of the Sewage Works Wisely, Exec. Sec., Sewage Works Federation; Arthur Bedell, Sec'y-Treas., N.Y.S.S.W.A.

is somewhat less than full activated sludge treatment but markedly more economical and ample for the available dilution. The results are superior to chemical precipitation and at less cost. The sludge is sufficient to supply gas for engines to produce all power needed in plant operation.

The advantages of the process include low air consumption (0.3 to 0.4 c.f. per gal.), short period aeration (1.5 to 2 hrs.), and the production of a dense sludge which may be concentrated to 4 to 8 per cent solids for economical handling and disposal.

The schedule of plans for post-war construction of sewage plants, as outlined by Mr. Gould, is shown in the accompanying table. Construction is planned to commence Jan. 1, 1945, assuming that the war situation will then permit.

POST WAR SEWAGE DISPOSAL PROGRAM FOR NEW YORK CITY

Project	Plant Capacity M.G.D.	Estimated Cost	Remarks
26th Ward Sewage Treatment Works..	60	$ 2,732,800	Completion
Owls Head Sewage Treatment Works..	160	14,500,000	Plant & Intercepting Sewers
Newton Creek Sewage Treatment Works	140	12,000,000	Plant & Intercepting Sewers —First Stage
Upper West Side Intercepting Sewers..		15,000,000	Grit Chamber & Sewers
(Extension to Wards Island Plant)...	200	15,000,000	Addition to Plant
Hunts Point Sewage Treatment Works.	120	14,000,000	Plant & Intercepting Sewers
Rockaway Sewage Treatment Works...	15	2,900,000	Plant & Intercepting Sewers
Whitestone Intercepting Sewer	...	1,300,000	To Tallmans Island Plant
Lower Manhattan Intercepting Sewer..	...	540,000	To Newton Creek Plant— Final Stage
Port Richmond Sewage Treatment Works	10	1,000,000	Plant & Intercepting Sewers —First Stage
East Bronx Intercepting Sewer	...	1,000,000	To Wards Island Plant
Coney Island Sewage Treatment Works.	...	300,000	Completion
Jamaica Sewage Treatment Works	...	65,000	Landscaping
Bowery Bay Sewage Treatment Works.	...	75,000	Landscaping
Two Sludge Vessels	...	1,500,000	
TOTAL	705	$81,912,800	

Chicago's New Filter Plant

Messrs. DeBerard and Gordon of the City of Chicago Engineering Staff told of many of the difficulties of continuing the construction of the South District Filter plant under the stress of wartime limitations. Mr. Gordon reviewed some of the history of the pollution problem of Chicago and the efforts to relieve it in the past by reversing the flows of the Chicago and the Calumet Rivers by the construction of sewage facilities and by the diversion of Lake Michigan water.

Mr. DeBerard showed graphs and maps of sampling stations near the water intake. Concentrations of coliform bacteria in the area between the Gary ship canal and the intake breakwater were exceptionally high in 1942. In the following summer of 1943, when the diversion was practically doubled, the concentration was far less than diversion alone would account for.

Other papers on this program concerned malaria now and in the post-war period, a report by E. L. Filby on "Blueprint Now," as well as a report on the Advancement of Sanitary Engineering by Prof. Gordon Fair. In this latter report it was of interest to learn that in the reorganization of the USPHS recently reported, a Sanitary Engineering Division was set up, and it was noted that the term "sanitary engineering" was used in preference to "Public Health Engineering."

N. Y. SEWAGE WORKS ASSN. PROCEEDINGS

At the business meeting of the Association, Secretary A. S. Bedell announced the actions taken at the Executive Committee, including the election of officers as follows:

Pres.—Wm. H. Larkin, Dist. Engr., N. Y. State Dept. of Health, New York City.

Vice Pres.—Dr. George E. Symons, Assoc. Editor, *Water Works and Sewerage*, New York City.

Secy.-Treas.—A. S. Bedell, Chief, Bureau of Sewerage, N. Y. State Dept. of Health, Albany, N. Y.

Asst. Secy.—A. W. Eustance, Dist. Engr., N. Y. State Dept. of Health, Geneva, N. Y.

Asst. Treas.—J. C. Brigham, N. Y. State Dept. of Health, Albany, N. Y.

To fill the places on the executive committee left vacant by the three retiring members, Prof. W. L. Malcolm, E. C. McKeeman and C. R. Velzy, the following members were elected by statewide ballot: Prof. C. L. Walker, Cornell University; Uhl T. Mann, Supt. Sewage Treatment, Cortland; and Henry Rath, Chief Operator, Tallman's Island Sewage Plant, New York City.

The secretary also announced that the executive committee had decided the Spring Meeting would be held on June 16-17 at the Hotel Syracuse in Syracuse, N. Y. Membership at the end of the year stood at 508, showing a decrease of 31, of which eight were by death. NYSSWA still retains the largest membership of any association in the Federation, contrary to the claims of the Central States Assoc. made at the Federation meeting in Chicago last October.

Canadian Sewerage Developments

The subject of "Sewerage Developments and Prospects in Canada" brought to the audience a refreshing interchange of ideas which stimulated thought and discussion. In Canada it is expected that sewerage expansion primarily to abate pollution will undoubtedly follow the cessation of the war. These were the opinions of Dr. Albert E. Berry, Director, Sanitary Engr. Div. of the Ontario Dept. of Health (and, incidentally, Vice Pres. of the Federation of Sewage Works Assns.). Dr. Berry noted in his presentation that public health in Canada is governed by the provinces and that municipalities usually constitute public health units, although there is some interest in sanitary districts.

There is no general practice as regards separate and combined systems but there is a tendency toward separate systems. Sewage treatment is generally similar to that in northern U. S. For 1,300 water systems there are 500 sewer systems, of which 115 have treatment plants. Seventy-one of these plants are in Ontario. Fifty-two of the plants have primary treatment only and 63 have secondary treatment. Low power rates favor the use of activated sludge, although contact beds were used in early developments and there is a tendency now toward trickling filters.

Sludge disposal is on glass covered beds or by mechanical dewatering.

Sewage Works Journal

W. H. Wisely, newly appointed full time Exec. Secy. of the Sewage Works Federation and Editor of Sewage Works Journal, brought to the meeting a verbal editorial, the main points of which were: "Don't lower the measure of standards during the war," "Take definite part in the post-war planning program promulgated by the Blueprint Now Committee," and "Take a pride in your work as a sewage plant operator." In regard to this latter precept, Mr. Wisely pointed out that many laymen looked askance at the work of sewage treatment plant operation, but he had found that lay groups could appreciate the problems and functions better if one considers sewage operators to be engaged in "municipal hygiene."

Controlled Digestion

Harry Schlenz, Vice Pres. of Pacific Flush Tank Co. of Chicago, presented a paper on various results obtained by "Controlled Digestion" by controlling various factors involved. Unfortunately the intent of the discussion period which followed was marred by the fact that several of the audience took rather violent issue with one factor presented, with the result that the early part of the paper was generally overlooked.

The effect of adding relatively small amounts of ammonium sulfate to digestor scum with consequent reduction of scum layers was attacked both as to its veracity and as to the cause and effect reasoning if it were true. Mr. Schlenz had presented some rather interesting observations on actual sludge digestion tanks primarily with the object of stimulating possible theories as to the reason for the observed reactions. Instead, vigorous condemnation of the results was forthcoming.

Aside from this quite controversial topic, Mr. Schlenz did present sound observations on improving digestion by the control of supernatant withdrawal by means of a supernatant selector which eliminates a large percentage of suspended solids that should not be withdrawn in the supernatant liquor.

A second feature of controlled digestion is the treatment of withdrawn supernatant liquor in a supernatant treator involving aeration by atomizing the liquor under a low vacuum through tuyeres. The net result of this treatment is to cause a flocculation of finely divided solids which may be returned to the digestor, thereby decreasing the B.O.D. and chlorine demand load on the treatment plant when the supernatant is returned to other processes.

A third feature of controlled digestion is the determination of volatile acid content in the supernatant and sludge liquors. When volatile acids rise above a predetermined value, independent of the pH, correction may be made by transfer of low volatile acid sludge liquor from the "incipiently sick" tank or by resting from feeding cycles. (Ed. Note: The writer utilized this method of volatile acid control of feeding of digestion tanks during the years he was chief chemist of the Buffalo Sewer Authority.) Recirculation of supernatant liquor to relieve scum layers is also advocated.

To adequately carry out these controls, certain piping arrangements between sludge tanks and pumps are necessary and Mr. Schlenz presented designs which he believes to be most suitable.

Grease Removal Symposium

A symposium on the problem of grease in sewage occupied the afternoon session with papers ranging from household grease traps to the determination of grease. Dean F. M. Dawson of Iowa State University opened the session with a paper on

Dinner Speaker
Ed. J. Cleary
Managing Editor
Eng. News Record
N. Y. City

Award Winner
Maj. Rolf Eliassen
U. S. Engineers
2nd Service Comm.
N. Y. City

"Grease Interceptors for Use in or Near Houses and Restaurants." Dean Dawson's comments were confined to grease and did not touch upon oils except to say that they too would be removed by the interceptors. Most grease interceptors have not been successful until recently because they were not of sufficient capacity for the rate of flow required. Noting that unless there is interception, the equipment is not an interceptor, Dean Dawson said that such equipment would function if properly installed and properly cleaned.

Inasmuch as none of the common greases congeal at temperatures above those at which most interceptors must operate, it is obvious that separation must occur because of differences in specific gravity and not because of congealing.

Factors to be considered in the proper design of such interceptors include the relation of length to height, particle size of the grease globules, rate of flow, and turbulence factor. For most designs the length is 1½ to 2 times the height; the size of the globules may be considered to be greater than 0.05 cm. or they will not rise. The rate of maximum velocity should be 0.1 ft. per min. and a turbulence factor of 0.5 should be used.

Dean Dawson showed the design of experimental equipment for rating grease traps. Pure pork lard is used as the testing substance mixed in the proportion of 1 lb. per 5 gal. of water. Test data depend on the procedure and strict standardization of technique is essential. Arbitrary standards for performance include a stored grease capacity in pounds of two times the rate of flow in gallons per minute with 90 per cent of grease retained in the trap during each passage of water until the storage capacity is reached. Tanks which do not meet these standards are rejected.

Exclusion of Greases and Oils from Sewers

C. E. Keefer, Assoc. Engr., Bureau of Sewers, Baltimore, had prepared a paper on the exclusion of oil and grease from sewers, but in his absence the paper was read by Albert L. Genter, Cons. Engr. of Baltimore. Mr. Keefer reported that following a bad explosion and fire some years ago in a Baltimore sewer, an ordinance had been passed to exclude inflammable materials from the sewers. By this ordinance and provision to collect these oils, some four million gallons of such material had been recovered and sold at 7½ mills per gallon. This material is dehydrated, distilled and the oil recovered in a process requiring about 12 hours for completion.

Grease Removal Ordinances and Problems

In the absence of Morris Cohn, San. Engr. of Schenectady and Editor of *Sewage Works Engineering*, his paper, "Grease Removal Ordinances and Grease Problems in Sewer Maintenance," was read by A. W. Eustance. Mr. Cohn's main points were concerned with the problem caused by the fact that grease will not stay in solution or suspension in sewers, whereas other materials will. Thus the use of sewers to be the carry-all for household wastes breaks down where grease is concerned. However, where the grease is a part of solid food discharged as from garbage grinders, this problem disappears.

Surveys of the country indicate that in towns of less than 50,000 there is little attempt to regulate the discharge of grease into sewers. In larger cities there is some attempt at regulation but there is no well defined trend in that direction.

Utilization of Sewage Grease

Wellington Donaldson, Chief of the Bureau of Sewage Disposal Design, New York City, gave pertinent comments on the "Utilization of Sewage Grease" with particular reference to the sale of sewage scum in New York City. Scum collected

and sold at 0.8 cents per pound wet has produced an income of approximately $8,900 per year. This income is not without some additional costs for handling and it is quite probable that after the war is over use of such skimmings will not be economically feasible.

The contract for the sale of these skimmings calls for the quantity to be measured on a cu. ft. basis with an estimated weight of 60 lb. per cu. ft. The time of collection, manpower involved, containers, and billing method are all stipulated in the contract, recently renewed after almost one year's operation.

Mr. Donaldson pointed out that the grease recovered was but a small fraction of that in sewage, amounting to but from 0.5 to 1 ppm. There are two methods of rendering the grease, wet or dry.

Linn H. Enslow, Editor of WATER WORKS & SEWERAGE, told of one grease trap that had always proved efficient. This is a cistern, elliptical in shape, with the top shaped somewhat like the neck of a milk bottle, and with discharge of wastes into the top of the cistern and falling through the accumulated grease with the effluent being taken from the bottom of the tank through a riser pipe. The tank is constructed in the ground, as are old fashioned cisterns, using no reinforcing and the narrow "neck" works for ease in collecting the grease.

The Grease Determination

Dr. W. D. Hatfield, Supt. of the Decatur, Ill. Sanitary Dist. and Dr. George E. Symons, Assoc. Ed. of WATER WORKS & SEWERAGE presented a paper on the "Determination of Grease in Sewage." This paper was in effect a report of the Standard Methods Committee of the Fed. of Sew. Wks. Assns.

When after seven editions of Standard Methods had been published it was discovered that the grease determination was no good, three new methods appeared to vie for a place in Standard Methods. A referee committee, appointed to study the three methods, brought forth no conclusion as to the best method except that results by any method were reproducible, the average deviation from the mean of triplicate analyses being between 1.7 and 2.1 ppm.

When the committee met to consider these results, "it was faced with two demands from the field, first to define grease and second to present a technique which will have the legal backing of APHA Standard Methods even though other methods seemed as good or were receiving further study."

Considering all factors concerned including the time of the test, ease of the determination, equipment required, the committee meeting in Chicago at the Federation Meeting in October defined grease as "that material in sewage which is extracted from an acidified sample of sewage, by petroleum ether (Bp. 40-60° C) when using the standard procedure outlined by the committee." The standard procedure includes acidification, refrigeration, filtration and extraction of both the filtrate and the grease retained on the cotton filter.

It was realized that this definition was an arbitrary one but from a practical point of view it determines the "grease which causes trouble in a sewage treatment plant."

The committee did not discount the applicability of the other methods studied, but believed the simplest method that produces reproducible results had been chosen. The committee further went on record as favoring additional study of a more recent method devised by Eliassen and Schulhoff consisting of lime coagulation, filtration with asbestos and acidification before extraction. This method offers ease of operation, simple equipment and short time of determination. If this method continues to warrant interest it will at least be included in the Appendix of non-standard technique in Standard Methods if it does not replace the technique decided on for the time being.

Joint Dinner and Awards

Following a social hour a joint dinner of the Sanitary Engineering Division of ASCE and the NYSSWA was held. Presided over by Clinton Decker, chairman of the ASCE San. Div. and with W. J. Orchard acting as Master of Ceremonies, and with entertainment, presentation of awards, comments by Malcolm Pirnie, Pres. of ASCE, an illustrated talk on "Wartime Engineering in South America," by E. J. Cleary, Managing Editor of *Engineering News Record*, the evening was a fitting climax to the sessions.

In addition to the NYSSWA past presidents key presented by W. H. Larkin to E. J. Smith, retiring president, the Kenneth Allen Award for the most meritorious paper of an engineering or research nature was presented on behalf of the Association by Dr. Symons. The citation read "By unanimous vote of the committee, the Kenneth Allen Award for the most outstanding research paper of 1943 by a member of NYSSWA, is presented to Major Rolf Eliassen and H. B. Schulhoff for their contribution entitled 'The Determination of Sewage Grease,' a paper evidencing high purpose, ingenuity, and utilitarian research value."

Ammonia Cylinders Short Too!

We recently called attention to the shortage again of chlorine cylinders because too many of them were in the hands of chlorine users and had not been returned to the manufacturing plants from which obtained. Now comes a letter from R. J. Quinn, of the Mathieson Alkali Works, speaking for the ammonia manufacturers saying, "through carelessness or hoarding there may not be enough cylinders and drums for transporting anhydrous ammonia. We believe that there are enough containers in service at the present time to take care of all users, *provided* containers are kept in circulation."

"Since idle cylinders and drums may mean a delay in meeting a war need, the necessity for urging all users of ammonia to order quantities for immediate requirements only, and to return these containers for refilling as quickly as possible, cannot be overstressed."

Adding our plea—PLEASE DON'T RELAX IN THE FINE JOB THAT WATER AND SEWAGE WORKS OPERATORS HAVE BEEN DOING IN THE EFFORT TO KEEP CYLINDERS IN CIRCULATION.

There is not enough steel available for both bombs and new compressed gas cylinders!

Water and Sewerage Developments in 1943

According to the Amer. Pub. Wks. Ass.n sewage disposal and water supply construction in 1943 continued at about 60 per cent of the peak Sept. and Oct. 1942 totals, while other construction dropped more markedly.

MAINTENANCE OF WATER WELLS

N. E. GUNDERSON
President
LAYNE-NORTHERN COMPANY, INC.
MISHAWAKA, IND.

IN the matter of water well maintenance, the principal trouble encountered is shortage of water. When such a shortage occurs, it is necessary to have all of the facts regarding a particular well in order to determine the cause. There are three principal causes for shortage of water supply. First, there is always the question as to whether the ground water level has lowered and decreased the available supply of water. Second, the condition of the well itself as it affects the capacity. Third, the condition of the pumping unit.

In order to make a proper diagnosis of the condition of a well, it is necessary to compare present operation with the operation at some time in the past, preferably original operating conditions. When a new well is constructed, the owner is entitled to three definite reports. First, a well log should be kept as the well is drilled, listing each different underground formation as it is found, noting particularly where water is encountered, a point very important in rock holes. Second, a drawing of the well should be made, giving all dimensions and length of casing, screen, and shoes. Third, a complete test should be run on the well. The latter involves a determination of the static or standing water level when the well is not pumping, then the pumping level and the gallons per minute yield for a pumping period of four to eight hours, or until the water level is stabilized.

The owner is also entitled to the same complete information on the pump installation. This should include the characteristic curve on the pump, the length and size of discharge column, the length and number of stages of pump bowl, the length and diameter of suction pipe, and the length of the air line below the base plate.

Well Tests

As soon as well trouble is experienced, a test should be run to determine current operating conditions. It is also good practice to run a test of this kind periodically thereafter, since it may be possible to predict trouble from the data at hand before it occurs. The instruments needed to run a proper test are a water meter or simple orifice plate; an air line in the well, with a suitable altitude gauge at the top; and a pressure gauge on the discharge of the pump. For the test the following should be determined: the static water level and water level after starting the pump, water level after pumping several hours, gallons per minute delivery, air line reading, and pounds pressure at the pump discharge.

The static level subtracted from the pumping level gives the drawdown or distance in feet the water level recedes when the well is delivering. Dividing the gallons per minute by the drawdown gives the yield of the well in "gallons per minute per foot of drawdown." This is the specific capacity of the well and is a very important figure.

For example, if a new well had a static water level 40 feet below the surface, delivered 200 gallons per minute, and had a pumping water level 50 feet below the surface, the specific capacity was 20 gallons per minute per foot of drawdown. If the same well at a later date showed 200 gallons per minute at a 60-foot pumping level, the specific capacity is 10 gallons per foot, or only one-half of the original yield.

Static Level

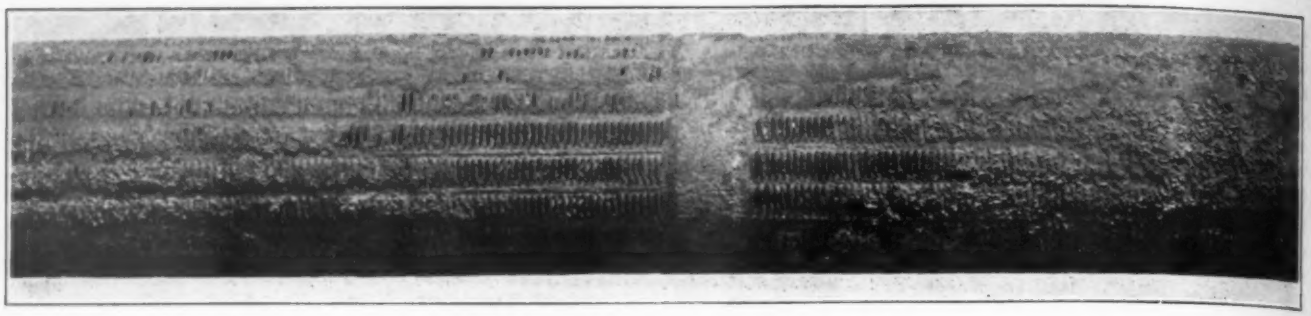
If the static level is compared with the static level measured several years ago, or when the well was new, it can readily be determined whether the ground water level has lowered. Since there is often a minor seasonal fluctuation of ground water level, it is preferable to take periodic sets of readings throughout the year; or, as next best, to compare readings taken at the same time of each year.

If it is determined that the static water level in the ground has dropped to a considerable extent, the only practicable remedy is, of course, to locate a deeper formation, or to look for a new well field if the lowering has become serious. In an area where only reasonable demands are made upon the water bearing formations, however, this question is not likely to become serious, because the available rainfall in the area is ample to recharge the underground formations, except in cases of extreme demand.

Thousand Gallon Acid Truck
Delivering Acid Directly to Job from Bulk Station

Causes of Well Troubles

If the tests indicate that the specific yield of the well has been reduced to a considerable extent, the condition of the well itself should then be examined to determine the true cause of the trouble. Mechanical trouble is loose material collected in the bottom. The material may come in through a hole in the casing or screen, or under the shoe of the casing. Old wells may entirely collapse due to corrosion of the casing. If it is determined that there is no mechanical trouble in the well, it is entirely possible that chemical trouble may have developed. This chemical trouble is the deposition of salts of lime and/or iron around the screen and in the water bearing for-



Encrusted 18-In. Screen After Eight Years' Service

(A Job for Acid Treatment.)

mations back some considerable distance from the screen. Originally, when rain water soaks through the ground, it carries sufficient carbon dioxide to dissolve lime and iron from the soil and from the limestone formation. Thus water often becomes saturated with carbonate of lime and iron compounds which tend to precipitate from the water on reduction in pressure, which permits the carbon dioxide gas to escape. The drop in pressure which brings on the deposition is caused by the draw-down of the well which represents the drop in pressure of the ground water required to bring the water into the well. Stalactites and stalagmites in limestone caverns are of the same material as forms in a well. The deposit which forms on all types of screen material has the appearance of grey to red putty when it is brought out of the well and examined, and usually hardens upon exposure to air. The tendency of a well water to produce this deposit seems to be based more on its stability than on its hardness. In some cases, quite hard water forms no deposit; while, in others, a water of low hardness will produce a deposit very rapidly.

Pump Troubles

In order to determine possible pump trouble, obtain the reading of the pump pressure gauge and convert this reading to feet. From the air line reading determine the pumping level or lift below ground. Adding the pressure in feet to the lift below ground in feet will give the total lift. Compare the gallons per minute produced at this total lift with the original pump curve and the condition of the pump can be readily determined.

If the pump is not producing the proper gallons or lift, the trouble may be caused by worn wear rings or by this same chemical deposit building up in the impellers, thus choking off the flow.

If it is found that the decrease in capacity is due to worn parts, the first step is, of course, to consult the pump manufacturer. Due to the scarcity of repair materials, it is extremely advisable to pull the pump on a regular schedule, possibly every two years, and check all bearings for wear. On an oil lubricated pump it is entirely practicable to reverse the shafting in order to expose a new bearing surface, and it is also possible, by adding a short section of shafting at the bottom to move the shafting up to a new bearing surface. Every time the pump is pulled, it is good practice to thoroughly clean and paint the discharge column in an effort to reduce corrosion on the surface. Only a good metal paint should be used which will adhere firmly to the surface.

When setting the pump in the well, as a precaution place a small rubber band around the pump bowl at top and bottom; particularly if the pump is finally set in the screen or in a casing only slightly larger than the pump. This rubber band can be cut from a section of inner tube. Any pump when running has a slight vibration, which in several cases is known to have actually cut through the screen or casing.

If the water is corrosive and the pump is pitting badly, it may be possible to reduce pitting by placing a small cylinder of zinc plate inside the horizontal discharge pipe next to the pump head, and another zinc cylinder inside the suction pipe just below the pump bowl. These should be riveted tightly inside the pipe, using iron rivets.

Mechanical Methods of Well Cleaning

In the operation of rock wells it is quite possible for loose material to accumulate in the bottom. Such loose material may come from a hole in the casing or under the shoe. Each time the pump is removed the well depth should be carefully measured and compared with the original well depth. As explained previously, a deposit may build up in the crevices or on the wall of the rock hole. If a set of drilling tools is run in the well it is likely to brush off most of the deposit on the walls of the well. Any deposit back in the crevices can be removed only by shooting the well or by the use of acid.

If the original log indicates the depth at which the water was encountered, it is good practice to place light shots of dynamite, spaced 10 to 25 feet apart, at the points where the water was encountered, with each shot ranging from 10 to 50 pounds. The principal danger in shooting is in placing the shots too close to the bottom of the casing. A peculiar fact about shooting wells is that rupture of the casing is most likely to occur at the surface of the water. If shots are not effective in restoring the well production, the next logical step is to use acid.

The acid naturally flows into the crevices from which the water was obtained and will tend to dissolve the deposit and enlarge the crevices. After placing the acid in the well, a definite quantity of water should then be run into the top of the well to force the acid back into the crevices.

Screened wells in sand or gravel are subject to the same mechanical troubles as rock wells, such as loose material in the bottom and holes in casing or screen. The most common trouble, however, is the formation of deposits around the screen and back in the formation, as described above. The two things to remember in undertaking a cleaning job are that the deposit must be loosened and then removed. If the deposit is only loosened but not promptly removed, it will tend to settle back into place with the same clogging as before. The simplest way of loosening deposits is by running an agi-

tator or close-fitting disc up and down in the well. This device has the disadvantage, however, that when a small section of screen has been cleaned, further use of the agitator concentrates the cleaning action on the portion of the screen already cleaned. This disadvantage of the agitator can be overcome by setting a smaller string of pipe in the well with the bottom closed, and a pair of discs on the bottom of the pipe, spaced one to two feet apart, with holes in the pipe between the discs. These discs can be set at any desired point in the screen and then the agitating effect is all concentrated at a given point on the screen.

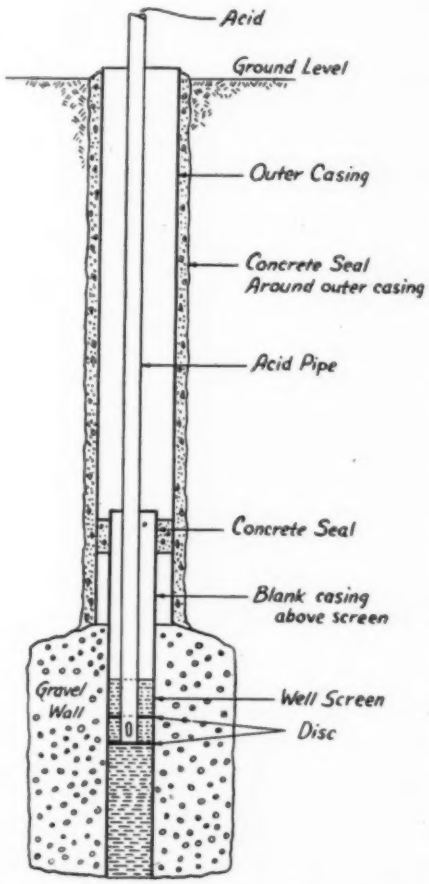
Compressed air for cleaning is often quite effective. Air should be used with the string of inner pipe as described above, and should be piped so that by simply opening and closing a valve the air is alternately blown back into the formation or the well is pumped by air lift. This method makes it possible to loosen the deposit and remove it a few minutes later.

Another method of cleaning occasionally used is to put 500 to 1,000 pounds of dry ice into the well and, if possible, cap the top of the well. The melting of the dry ice produces violent agitation and considerable pressure but does not remove the deposit. In some cases, backwashing a well from an outside supply of water has produced some improvement, but this method cannot be particularly recommended because it tends to wash the deposit back into the formation. A strong mechanical agitation can be obtained by piping steam down into the well where the rapid condensation provides a violent disturbance. All of the above mentioned methods of cleaning are what might be called mechanical methods, and there is also a mechanical method of preventing or reducing the formation of these deposits. When the pump is installed, if the suction on the pump is sealed tightly to the well screen, a strong backwash is provided each time the pump is stopped and the deposit is removed each time the pump is started. This seal also prevents exposing the water to the air at any time and reduces the tendency to deposit. A very simple seal can be made by building up a cone on the suction pipe made of strips of burlap saturated with tar. This cone should be placed so that it seats tightly in the top of the screen, just as the pump settles down on the base plate, so that the weight of the pump forces the seal into position.

Chemical Methods of Well Cleaning

In recent years the cleaning and developing of wells chemically, using inhibited hydrochloric acid, has been receiving more and more attention. In most cases, hydrochloric acid will dissolve a large percentage of the deposits. Failures are probably due to the fact that the acid could not reach the deposit to work on it. The most important advance in acidizing is by the use of an inhibitor which largely reduces the action of the acid on all metals without reducing its action on the calcareous deposits. Inhibitors range from 80 to 98 per cent effective, but in their selection caution should be used to be sure the inhibitor is non-poisonous.

Another improvement in acidizing work is the use of a stabilizer. When



Method of Applying Acid to Individual Screen Sections—See Text

the acid is first placed in a well it dissolves the "iron" and "lime" deposits rapidly, but as the acid becomes spent the power of the acid to hold the chemicals in solution is reduced, and there is a strong tendency for iron compounds to deposit again. The stabilizer prevents this redeposition and holds the iron in solution once it has been dissolved. In using acid it is also highly desirable to heat the solution in the well. A hot acid solution acts much faster than a cold one and will also dissolve deposits which cannot be dissolved in cold acid.

There is a slow horizontal movement of ground water and in some cases cold acid has been actually carried away from a well before it could complete the job of cleaning. The fast action of hot acid makes it possible for the cleaning to be completed before the flow of underground water tends to carry the acid away.

It is also important in using acid to be sure that the acid reaches the deposit so that it can do its work. It is a mistake to simply dump acid into the top of the well. The acid should be placed through a hose line or pipe, the end of which is moved up through the length of the screen so that the acid is properly distributed. A still better way is to apply acid through the inner pipe device with two discs, as previously described, so that the acid can be delivered to any part of the screen desired. Systems have been worked out by which acid can be pumped under pressure through short sections of screen and then circulated, thus providing a washing action. Expanding devices have been used which permit application of heavy liquid pressure at selected points on the screen, which, added to the chemical effect of the hot acid, provides a very positive method of cleaning.

In using any method of acidizing, precaution should be taken to protect the men engaged in the work. The acid produces carbon dioxide gas, which comes out of the well and which cannot be detected. The work, therefore, should never be done in an unventilated pit because the workers might actually be "drowned" by carbon dioxide. In most cases the well top should be as open as possible with ample ventilation.

Following the cleaning operations the well should be flushed by pumping and the static level, pumping level, drawdown, output, and yield again determined and recorded.

[ED. NOTE: Recently some success has been had through the use of chlorine gas as a means of loosening and dissolving calcareous deposits in wells. The gas pressure serves to surge the water and the chlorine attacks the carbonate, producing carbon dioxide, hypochlorous acid and the soluble chlorides without first forming any hydrochloric acid. Hypochlorous acid is a very weak acid but will further attack the calcareous deposits.]

IS WATER MAIN CLEANING GOOD ECONOMY?

By JAS. R. BROWN
Branch Manager
NATIONAL WATER MAIN CLEANING CO.
CHICAGO

Lest some readers may get the idea, upon reading this article, that the author has sought and secured free publicity for his company and what it has to sell in the nature of service in the water works field, we wish to clear up any such false impressions at the beginning.

Mr. Brown was expressly asked by "Water Works and Sewerage" to write this article. And, while it fails to tell the story of the economy of water main cleaning as fully as we had hoped it might, it does reveal some of the important aspects of main cleaning from the economy viewpoint.

This article was requested with the one idea of attempting to stimulate a wider interest in water main cleaning during this period of construction inactivity and deferred maintenance in the water utility field. There are some betterments that can be had in water supply during the stringency of critical materials; and, transmission main and distribution system surveys and main rejuvenation by cleaning must be classified as "firsts" amongst such improvements.

With some of the surplus accumulated in water works treasuries it would seem an excellent and paying investment to have systems surveyed, cleaned where needed, and otherwise rejuvenated. We would wager that even without the survey there are thousands of instances where ample indications exist that point to the need for main cleaning, and water treatment to retard the rate of subsequent tuberculation.

A question which frequently recurs is this—"Why is it that water utilities operated from private capital find it good economy to clean supply lines and mains at regular intervals whereas, on the whole, municipal management seemingly fails to appreciate the benefits which main cleaning can effect; or, for some less understandable reason, does relatively so little to keep power dollars out of the sewers (literally), and to keep peak load pressures where they should be?"

This was the question which prompted "Water Works and Sewerage" to request Mr. Brown to write the present article. Perhaps some other of our readers will assist us in throwing more light on the question—"why doesn't main cleaning pay? And, if it does, why then so sparsely practiced under municipal ownership?"

With sincerity in our wish for the whole answer to this pertinent question, the pages of "Water Works & Sewerage" (as few as they be at present) are open to those who may be "agin" as well as those who are for "Water Main Rejuvenation." A series of articles on this topic can prove a worthwhile service to American water works management and, herewith, an open invitation to participate. —L.H.E.

WITH the continuous problems which arise in water works distribution systems almost every day, coupled with the drain on man power and the scarcity of critical materials, the question asked by the title of this article answers itself affirmatively.

During the past year we have been confronted with difficulties which, under ordinary circumstances, could be easily overcome by quick repairs or new installations; but, with priorities still existent and depleted working crews, it has become necessary for most water works superintendents to obtain the maximum results from the equipment in service and at their disposal.

With the war in its third year, it is the belief of the writer that every water works man is aiming for Victory—the sooner the better—and tries to find ways to do his job well, to play his part in the war effort. The job of the water works man at home is a most important one, and since it is now up to him to do his best with what he has, maintaining his plant and distribution system at the highest possible degree of efficiency should be his first thought.

We have read about and heard many prominent consulting engineers who claim there are thousands of miles of cast iron pipe in water supply systems in the United States that average over thirty years of service. They also claim that many of these mains are so incrusted with foreign matter that their original capacity is probably reduced as much as 50 per cent.

The Author

Obviously, with mains in such condition, no water works superintendent can hope to deliver a maximum amount of water to his consumers and often this failure is the cause of dissatisfaction and unnecessary losses.

All of us know the hazard of fire! And quite regularly we read in daily papers of disastrous conflagrations, with many of the descriptive items including comments concerning the lack of water pressure.

Why Clean Mains?

The cleaning of water mains not only eliminates the two above complaints; it also assures lower pumping costs, cleaner water and lower insurance rates.

The war has brought many changes in this country's way of life, some of which directly affect water works distribution systems. The most important are the greatly increased consumption of water and, at the same time, the greatly decreased supply of materials and labor for water works construction purposes. Population influxes into many cities and into nearby training camps are bringing many water departments the heavy responsibility of providing sufficient water service for thousands of new users.

To take care of the extra demand for water today, without replacements, is often a problem, but it can be quickly remedied by the cleaning of existing mains.

Water main cleaning is not a difficult undertaking. The methods and results have been described in numerous published articles, but it may be well to review the procedure

briefly, in view of the present situation.

Cleaning Procedure

Mechanical cleaning of water mains requires opening the pipe in two places, inserting the cleaning machine and making up the pipe at the place of entry, setting a riser pipe with a 45-degree bend at the other end of the run, propelling the machine through the pipe by water pressure or by cables (hand drawn or motor drawn) and, finally, after emergence of the muddy water and the machine at the exit, shutting off the water, removing the riser pipe and reconnecting the main. The footage of pipe which may be cleaned in a single day will depend upon such factors as the amount and nature of the incrustation, tuberculation or deposit, the water pressure available, the layout of the system and the facilities for the discharge of wash water and, not least important, upon the efficiency of the working crew. Prompt shut-offs and rapidity of cutting and making up determine whether one or more shots can be made in one day.

Mains of the smaller diameters cannot always be pressure-cleaned, but usually in 8 inch and larger pipe, the pressure-driven cleaning machines can be employed. Whether the smaller pipe is cleaned by the cable or the rotary method, the length to be cleaned in a single operation will depend upon the kind and location of bends and tees. In mains which are cleaned by pressure-driven machines, the factor of location and kind of bends is not too important, for the cleaning machines readily pass through 45- and 90-degree bends except where two 90-degree bends are placed close together to form an offset, in which case it may be necessary to cut the pipe at that point.

The amount of pressure work which can be done in a working day is determined by the efficiency of the crew, which must cut and make up the line before and after the cleaning operations. The pressure cleaner should travel at a rate of approximately 100 fpm., i.e., at a little more than one mile per hour, so that it cannot be expected to clean more than about five miles of pipe in a working day. With overtime, however, it is possible to make even longer shots, the longest one, to the author's knowledge, being the cleaning of some 70,000 feet of 12-inch cast iron pipe.

The work can be done at night, if necessary, in five to seven hours for any section of pipe, and service can be resumed very quickly in an emergency.

There are numerous ways that a water works distribution system may become clogged. Incrustation, tuberculation, silt and sand are the most common, the nature of which varies in different parts of the country. Where water mains have been affected by any of the foregoing, it is obvious the carrying capacities have been reduced, friction losses have been increased, also operating costs, to a far greater extent than is thought possible, even though sections of pipe have been removed and examined. This condition has been aggravated from year to year and

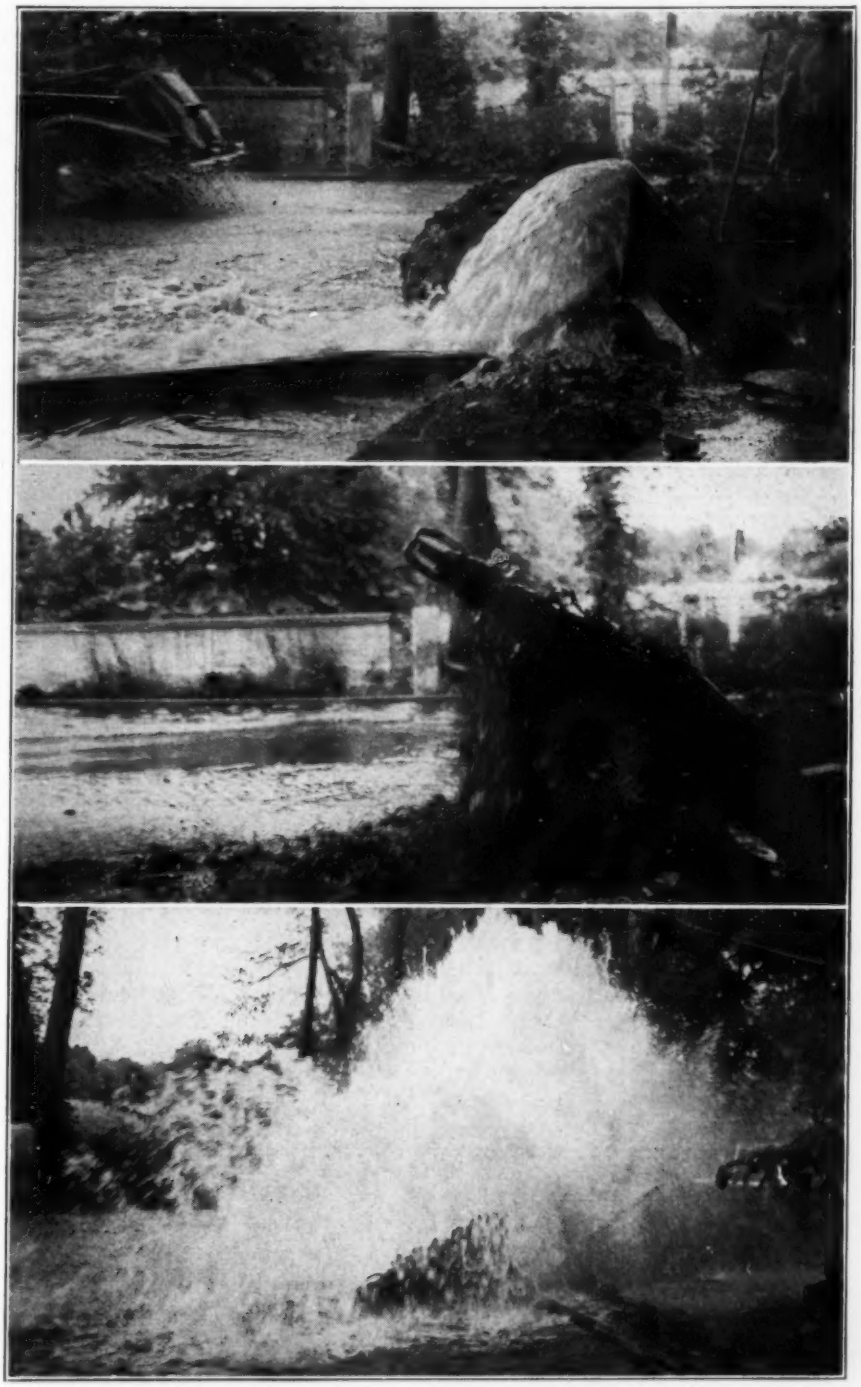


Exhibit "A"—A Main Cleaning Operation

No. 1.—Outlet arrangement on section of 16-in. main to be cleaned, showing the best that this main could produce in the way of a friction weakened flow, and a power-dollar-eating pressure loss.

No. 2.—Then, from this 16-in. tube a "torpedo of economy" emerges, bringing with it tubercules and other incrustation. This multi-finned "torpedo" is the water head self-propelled cleaning machine.

No. 3—And, behind the machine comes this gratifying result, in which one picture is worth more than a thousand words.

now, when the demand for a greater quantity of water has arrived, the mains cannot deliver their expected capacity. Which means—they must be replaced, duplicated or cleaned.

Comparative Costs of New vs. Cleaned Mains

With the thought of replacing, duplication or cleaning in mind, it might be well at this point to make a comparison of man-hours and ferrous metals required for laying new pipe and for cleaning water mains. The following table shows clearly the advantages to be gained by water main cleaning:

Comparison of Manhours and Ferrous Metals Required for Laying and for Cleaning Mains

Main. Diam.	Laying Mains: Manhours per mi. for Hand Work in 3 ft. of sand	Laying Mains: Manhours mi. for Trench Machine in 3 ft. of sand	Laying Mains: Ferrous Metals per mi.*	Clearing Mains: Manhours per mi.	Clearing Mains: Ferrous Metals per mile†
in.			lb.		
6	1,404	763	176,000	422	1,900
8	1,554	843	250,800	253	2,500
10	1,760	971	336,600	169	2,325
12	1,967	1,105	433,400	169	3,000
16	2,276	1,268	660,000	211	4,500
20	2,641	1,477	924,000	252	6,100
24	2,995	1,702	1,232,000	252	8,100
30	3,545	2,041	1,760,000	252	11,600
36	4,200	2,477	2,398,000	252	15,600

*Using class "B" pipe.

†Average for all diameters, taken over a 5-yr. period, and arrived at by taking all steel purchased and dividing by the number of miles cleaned. This covered materials per mile as follows: ⅜-in. cable, 27.14 lb.; ¼-in. cable, 0.34 lb.; 3/16-in. cable, 22.52 lb.; high grade steel, 5.50 lb.; and other steels, 42.0 lb. To this 9750 lb. per mile has been added weight of pipe and sleeves for repairing cleaning cuts

As before stated, with clogged mains, friction losses become greater. Friction losses mean power losses, and power costs money. The reduction of friction losses saves power, and with the drive to conserve all the electrical power possible now prevalent throughout the country, the cleaning of water mains will help immeasurably in this effort.

Yearly Cleaning Programs

Early in his tenure of office, President Roosevelt referred to the "Forgotten Man." The author of this article wonders how many city officials today could refer to the "Forgotten Main."

Many miles of water mains are cleaned annually, and numerous cities practice a program of some main cleaning every year, thereby assuring themselves of a maximum supply of water. Too often, only short sections of the distribution system are cleaned because of an emergency or inspections have shown heavier deposits in one section than in other sections of the system. A great mistake will be made if it is decided that cleaning is necessary only of the heavily coated pipes. Experience has shown that the flow of water through pipes is affected just as seriously by the small lumps, or tubercules, even though they are only 1/16 inch in height and spread some distance apart, as by the reduction in pipe diameter by uniform tuberculation. This condition of sparsely spaced small lumps has been known to account for losses of 30 to 50 per cent in the carrying capacity of large mains and must be much greater in small mains.

A practical illustration of the results of this condition is the barnacles on the bottom of a ship. The rough surface of the barnacles creates so much friction when the ship is moving that its speed is greatly reduced, and consequently the boat is put into drydock and cleaned. In the case of the water main, the water is the moving body, but the result is the same. If the loss in efficiency is so great in the case of the slow-moving ship a few hundred feet in length that it must be cleaned, the loss in efficiency in the case of water mains miles in length, with fast moving water, must be tremendous, and they, too, need cleaning.

From the comparative table in this article, it is plainly obvious that the cost of water main cleaning is but a small fraction of that for laying new mains.

The justification for the cost of cleaning water mains is in the length of time the pipes remain cleaner than they were before the cleaning work was undertaken. This should be an average period of ten to twelve years, but often this period is considerably longer. This, however, is determined by the nature and treatment of the water.

Therefore, water main cleaning should be well worth the time, effort and any inconveniences involved. The latter are really small by comparison with the results obtained, for the pipe line or distribution system will have been restored to its original carrying capacity quickly and economically, without the use of critical materials or of labor needed for more urgent purposes.

Walter Kunsch Succeeds Wisely at Champaign-Urbana

Walter M. Kunsch, formerly operator of the Danbury, Conn. sewage treatment plant and later operator of the Camp Endicott (R. I.) treatment plant, was selected as the successor to W. H. Wisely, as Engineer Manager of the Urbana-Champaign, Ill., Sanitary District when Wisely became full time Exec. Sec'y and Editor of the Federation of Sewage Works Associations.

Walter Kunsch

Mr. Kunsch, who took over his new duties on Jan. 1, is a graduate Civil Engineer of Cornell University (1934), and did some advance laboratory study at New York University. Kunsch received an award of the New England Sewage Works Association this past year for his annual report prepared in 1942.

Mr. Wisely will maintain his office as Federation Secretary in Champaign, and will become a special lecturer in Civil and Sanitary Engineering at the University of Illinois.

"VETERANS"

A Story of Almost 42 Years' Association With a Pumping Engine Worthy of the Name—"Old Faithful"

By THOS. L. AMISS
Supt. and Engineer
DEPT. WATER AND SEWERAGE
SHREVEPORT, LA.

"Well, here is the article promised. I do not know how it will sound to you or your readers, but to me this pump is really human."—T. L. A.

"Veteran and Engineerling"

The author today and 42 years ago when appointed Assistant Engineer at Shreveport in 1902.

The subject matter of this article may seem of little consequence to the reader at first thought, but I feel safe in saying that there are many superintendents or engineers of long records who will agree with me that some inanimate objects written about deserve a high place among proven veterans in the water works field.

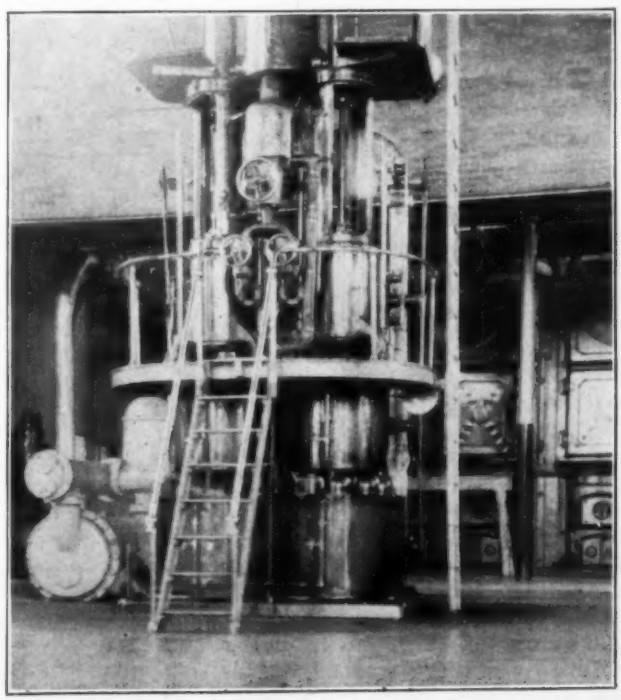
I say "veteran" advisedly, for upon looking up the definition of veteran, I find the following: "Growing old in service; experience through long service; having served a long period, and so on." This pumping engine has met all of these requirements; therefore, I say "veteran," and to that I might add "Old Faithful," which would typify a faithful veteran.

By Way of Introduction

As is the case of an individual, a name is necessary for identification; therefore, as an introduction, let me present Henry R. Worthington's Pumping Engine No. 1251, from Hydraulic Works, New York, N. Y. Born October, 1897, christened 1899, it went to work almost 45 years ago (1899) for the Shreveport Water Works Co., of Shreveport, La.—then a subsidiary of the American Water Works and Guarantee Co., of Pittsburgh, Pa., which later became the American Water Works and Electric Co. of New York, N. Y. Then, on January 1, 1917, it became the property of the City of Shreveport, to continue its day in and day out duty under municipal ownership, along with the undersigned.

I can very vividly remember that it was some time way back in early 1902 when I first visited Shreveport's McNeil Street Pumping Station (Arsenal Hill of 1863-65), on the banks of Cross Bayou, and saw for the first time this then youthful piece of machinery. I say youthful, for it was all but brand new, having been erected in 1899. It stood out to me in contrast to the other machinery; it being a vertical Triple Expansion Engine, which stood twenty feet in height above the floor level, with the water end buried deep in a circular brick pit fifty feet below the floor level, taking suction from Cross Bayou by way of a six-foot tunnel. This dizzy height and depth combined in one engine was much for a youth of not yet twenty to behold, because he was just then starting on his water works career. Because of its apparent friendliness (exemplified through its rhythm of motion, noiseless operation and performance of duty) we early became close friends. I say a close friend because it was not many years before the continuity of service of the water supply of Shreveport became my responsibility, and I will say at this juncture that this pump has never failed me nor any of the others for that matter. And until but a few days ago this pump was doing her twenty-four hour day duty the same as of old, assisted by another younger pump of the same type and make (see picture) and by a cross compound duplex pump, and our latest addition—a new centrifugal. I can now see ahead a well earned rest period for this faithful veteran. It is to be placed in a position of alternate service with the other pumps, and not be called upon to longer do daily

"Old Faithful"



Henry Worthington's Pumping Engine No. 1251

After almost 44 *years of continuous dependable service in Shreveport's water works. The engine stands* 20 *ft. above floor level; the direct acting plunger pump being in a* 50 *ft. deep pit.*

twenty-four hour duty in its old age. When this pump went to work, Shreveport's population was 17,000; at present, the metropolitan area boasts 135,000 population.

Some Performance Observations

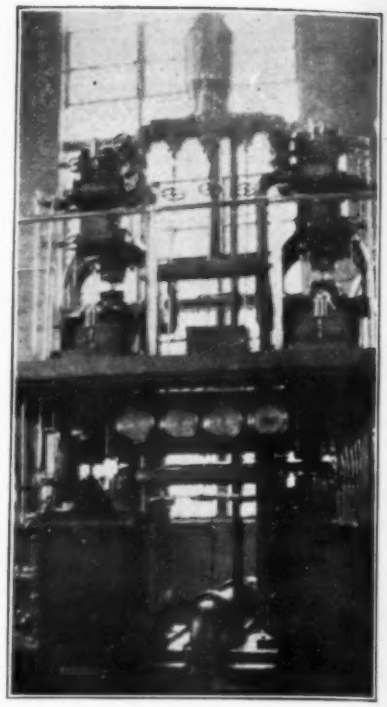
As time went on and I became better acquainted with the work of

Another Veteran

John N. Chester, of Pittsburgh, Pa., former Chief Engineer of the Am. Water Works & Electric Co., when "Old Faithful" was installed.

this "Old Master," I began figuring on just what did this pump do, and to my astonishment found that, in one day of twenty-four hours (it being a reciprocating engine), the piston started twice and stopped twice in every revolution and, making 36 revolutions per minute, made 207,360 actual movements. This is exclusive of the many valve cut-off movements. A pump of this type having two separate sides, so synchronized as to alternate strokes, presents a real rhythm of motion with a total of 414,720 movements during the 24-hour day, faithfully delivering 16,666 tons of water to its destination as its part of the service. I say to watch a pump of this kind perform its work is to marvel at the ingenuity of man and, like most pieces of machinery, certain human characteristics have been placed into it by *some* man. This pump has meant much to me personally because it has allowed me many times to go home and rest. On the other hand, should it have failed to function faithfully and dependably, I would of necessity have had to be on duty many hours more. To think back when we had only two pumps for the work, the confidence I had in this pump perhaps kept it running many times. In other words, it wouldn't let me down.

This pump and the writer have together a continuous record of 87 years—a couple of "veterans."



Worthington's Pumping Engine No. 1261

Essentially a duplication of Engine No. 1251. This recent photo was taken of the front side of this sister pump because "Old Faithful" had already been partially dismantled for overhauling, incident to being "commissioned in the reserve."

BUILD YOUR OWN!

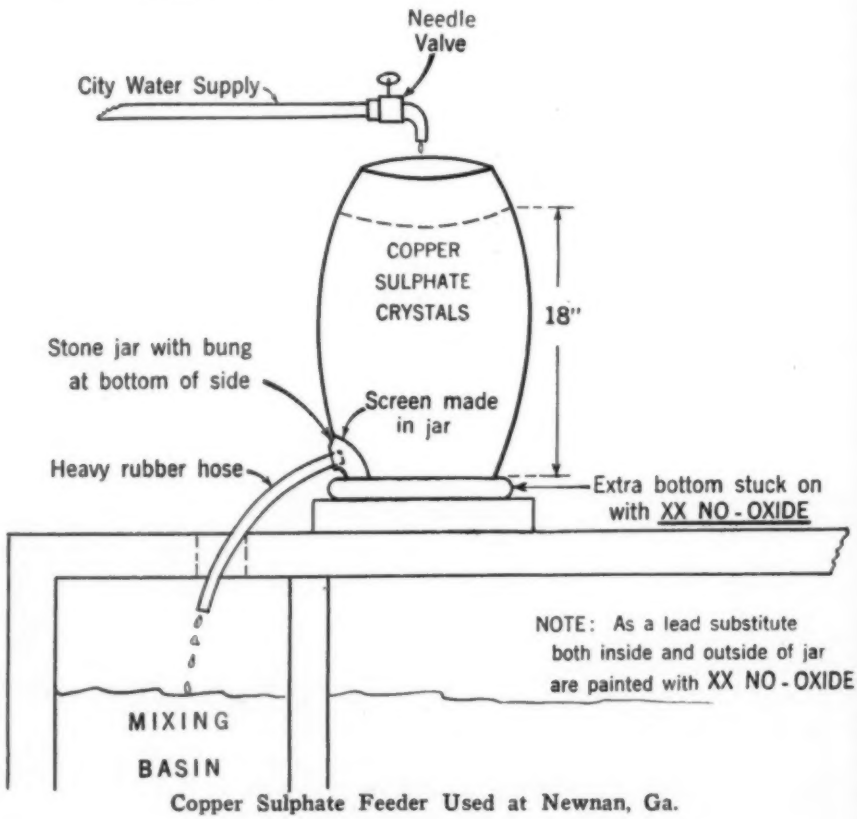
By BARTLEY J. CASH
Ass't Superintendent
DEP'T OF WATER AND SEWERAGE
NEWNAN, GA.

"Gadgeteer" Cash

If you haven't the priority or the money to purchase something that will aid in the operation of your plant, or if the manufacturer doesn't stock it or never has made one, then build your own. The accompanying two drawings show two handy gadgets which were built at Newnan, Ga.

Copper Sulphate Feeder

The copper sulphate feeder is made from a stone jar, which unless


Needle Valve
City Water Supply
COPPER SULPHATE CRYSTALS
18"
Stone jar with bung at bottom of side
Screen made in jar
Heavy rubber hose
Extra bottom stuck on with XX NO-OXIDE
NOTE: As a lead substitute both inside and outside of jar are painted with XX NO-OXIDE
MIXING BASIN

Copper Sulphate Feeder Used at Newnan, Ga.

protected will disintegrate in copper sulphate solution. For this protection, XX-No-Oxide paint was used and has served very well for a considerable length of time.

About 18 inches of crystals are placed in the jar and the rate of solution is controlled by a needle valve on the city water supply. This is a very simple arrangement which functions satisfactorily where copper sulphate is used for algae control in a basin.

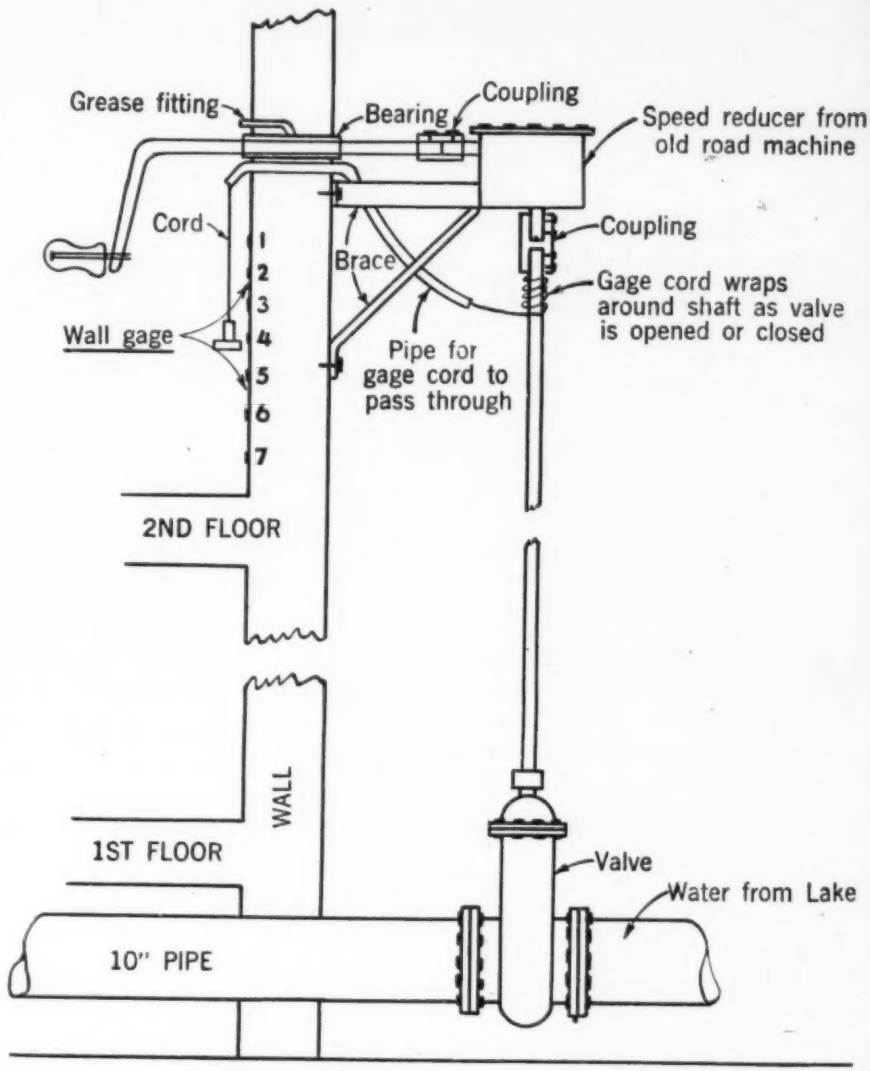
Remote Control Valve

At the Newnan Filter Plant a control valve on the raw water line from the reservoir to the mixer is located outside the building. An ordinary 10-in. valve, it served its purpose well to control the flow of water into the plant. The only difficulties were that to open or close it meant that the operator must go out of doors and he usually had to estimate just how far the valve was open.

By means of the couplings and gear box shown in the drawing, it is now possible to open or close the valve from inside the building. And by the simple expedient of a cord which wraps around the valve stem it is possible to gage the setting of the valve. This cord is attached to a weight which moves up and down in front of a gage marked on the inside wall of the building.

If you can't buy it, build your own.

[In an article to follow a couple of sewage plant gadgets will be described by Mr. Cash.—Ed.]



Remote Valve Opening Device and Indicator

A World Traveler Learns Value of Sludge Fertilizer

(And America Is Doing Likewise)

"For many years our company has advocated the utilization of sewage sludge for fertilizer, which has far too long been burned, buried or otherwise destroyed or wasted by many cities," writes S. B. Davies, president of the Royer Foundry & Machine Co., of Kingston, Pa. "We have preached it in public places and shouted it from the housetops and during the last decade our efforts have borne fruit.

"Scores of cities now dry and shred their sewage sludge for use as lawn top dressing and as a general soil builder. Many of these cities use our Royer sludge disintegrator to shred and aerate the sludge and to mix in enrichening chemicals where it is desirable to do so.

"Germany and France have long been known for their proclivity for scientifically utilizing sludge, and China, of course, has long considered it not only logical but absolutely essential to return wastes to the soil. But it remained for John Patric, traveler, lecturer and writer, to reveal the true significance that our enemy, Japan, attaches to sewage sludge. In his recently published book, 'Why Japan was Strong,' a condensation of which appears in the January, 1944, issue of The Reader's Digest under the title, 'Hobo in Japan,' Mr. Patric reports a conversation with Mr. Tayama, a Japanese citizen who spoke English sufficiently to express himself as follows:

"'Sewage more richer fertilizer than animal manure. You think Japanese *like* dirty, smelly work collecting and spreading human manure? But no choice. Japan must return to land everything possible to replace fertility.'"

"When one realizes, as Mr. Patric points out, that Japan with a population of over 75,000,000 is able to cultivate only one-seventh of its land area, the rest being too rocky, mountainous, wet or cold to be arable, one can visualize the urgent need for utilizing sewage sludge and all other readily available soil improvers.

"Mr. Patric, in the article cited, also points out that sewage treatment equipment as widely employed in America and many European countries is practically unknown in Japan, the septic tank and the 'back house' being the order of the day."

In the present scarcity of available nitrogenous materials and organics for commercial fertilizer production, Chicago, Milwaukee, Houston and others are selling dried granular sludge at most attractive prices. In American newspapers one sees Milwaukee's "Milorganite" widely advertised by large department stores and seed and fertilizer dealers. It sells for more than dried pulverized cow manure—is worth more.

After the war one can anticipate a continuation of demand for sewage sludge, which is at long last coming into its own. Commercial fertilizer producers cannot thwart the demand which is now being established. Long freight hauls will, of course, prove unprofitable; but in short haul and local territory a properly prepared sludge should continue to enjoy the market which this war has created.

WATER FLOW THROUGH PIPES

A Nomograph for Solving the Hazen-Williams Formula

By DONALD R. KEITH
Civil Engineer
DIVISION OF WATER
COLUMBUS, OHIO

MANY hand-books containing hydraulic data include tables for solution of the Hazen-Williams formula for flow of water in pipes. These tables are limited in their scope and give results for "V" only. Then you either figure "Q" from "V", or find some other table which shows these values.

Even with the tables it is necessary to do a certain amount of calculation, such as interpolation, etc., for seldom does your problem fit the figures in the table.

Some books contain curve charts for the solution of this formula, but only for "V". The curve charts are usually of such small scale that they are tedious to use, and will not give results close enough for practical purposes since the width of a pencil point might make a very definite difference in the value of "V".

To provide a practical device for the solution of pipe discharge problems continually confronting the Division of Water and the Sewage Department of Columbus, the accompanying chart was constructed; a chart accurate enough for all practical purposes, simple enough in its operation for an individual of average intelligence to use, and furthermore, one comprehensive enough to solve every problem that had to do with the flow of water in pipes.

The Hazen-Williams formula was selected for the reason that it seems to be more generally used and accepted than any other.

To the main formula,

$$V = CR^{0.63} S^{0.54} \quad 0.001^{-0.01}$$

was added,

$$Q = AV = 4\pi R^2 V$$

in which

V = Velocity
R = Hydraulic radius
S = Slope, or loss of head
C = Coefficient.

The value of "C" depends on the material and condition of the inner surface of the pipe. [See accompanying table of "C" values.]

In laying out the R-scale, it was immediately seen that the operation of chart would be simplified by adding the pipe diameter-in-inches-scale to the opposite side of the line by the formula R=D/4.

The Q-scale was first laid off for discharge in cubic feet per second, then to simplify, a scale showing discharge in gallons per minute was added to the opposite side of line.

The scale-modulus for the R and S-scales is 8, that is to say, the logarithmic cycle for each of these scales would equal that of an 8-in. slide rule, in the original size of chart as constructed; in the C-scale the cycle is 6.84-in.; the V-scale, 3.42-in.; and the Q-scale, 1.844-in.

The S-scale is graduated in decimals of one foot to the lineal foot. In problems involving loss of head, such as one foot loss of head in a thousand lineal feet, use the point 0.001 on the S-scale, and move the decimal period three places to the right (1.00). The S-scale is used for slope, loss of head, and pressure expressed in feet.

Values of "C" of course depend upon the material and condition of inner surface of pipe as noted on the accompanying chart. Tables showing values of "C" for various kinds of pipe old and new, may be found in any hand-book of pipe data. For convenience of the user of the chart these values are listed in the following table.

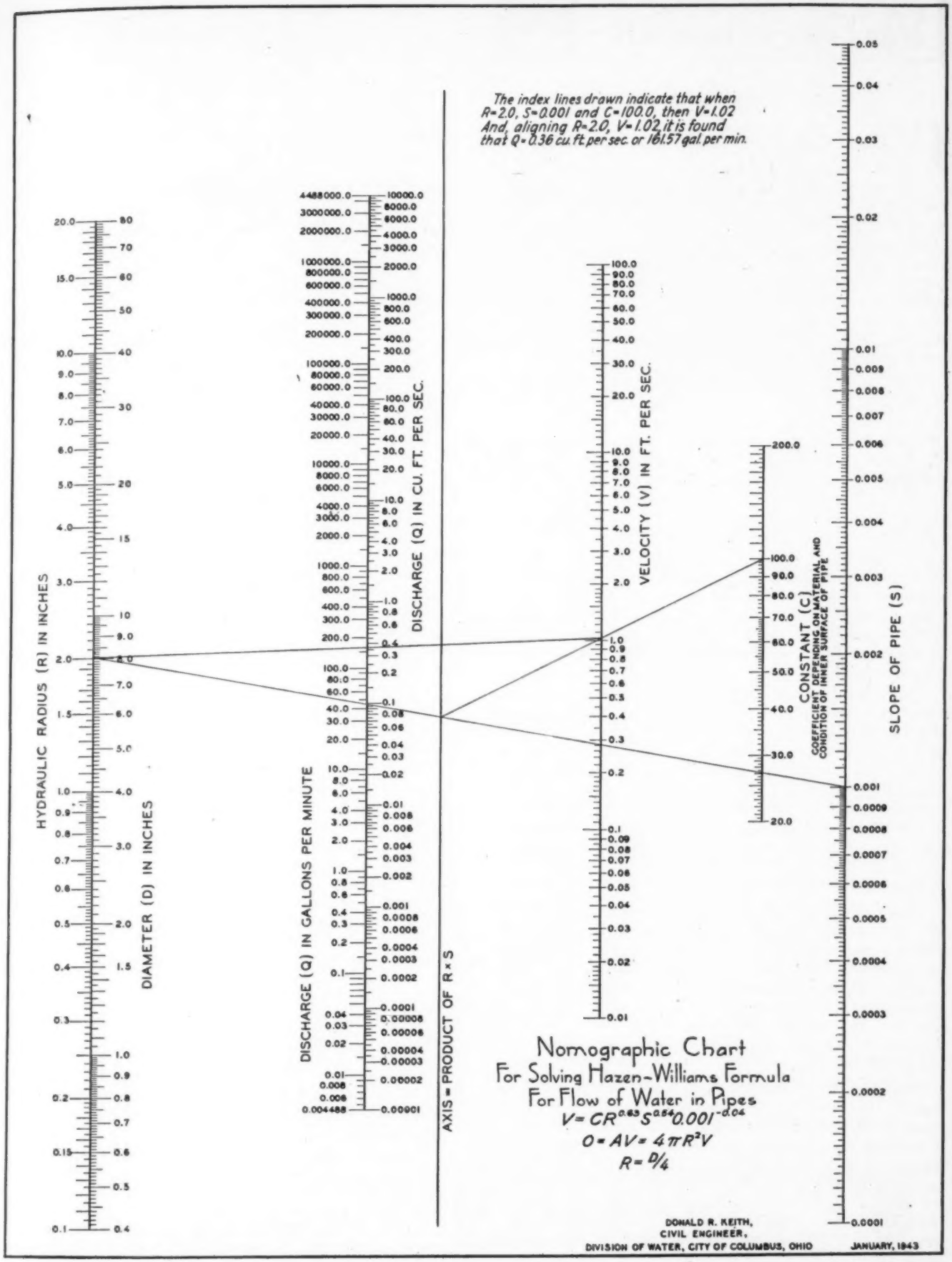
"Hazen-Williams Table of Values for 'C.'"

Cast Iron Pipe, very smooth	140 to 145
" " " new, good condition	125 to 135
" " " old, good condition	100 to 125
" " " old, bad condition	60 to 100
Steel Pipe, riveted new	105 to 115
" " riveted old	90 to 105
Masonry Conduits	110 to 135
Brass, block tin, lead, glass	140 to 150

Ed. Note: Readers of our January 1944 number will recognize this contribution as a repetition of that which appeared in January. It will also have been noted that the chart in January reproduced very poorly, and that the author's explanation of the chart and its uses contained conspicuous typographical errors.

This item was rushed through as a last minute insertion and, unfortunately, it was not detected that the faint lines on the cut of the chart were to reproduce so poorly in the press run. And, it is even more regrettable that the lack of adequate proof reading seems to have gone completely un-noticed.

In order to give to our readers a more satisfactory chart for their files or notebooks, and an explanation of its derivation and uses free of typographical errors, we felt it due Mr. Keith and our readers to repeat his valued contribution and to reproduce the chart from a re-drawn copy in order to obtain a clearer definition of those finer lines which are either too scratchy or entirely missing from the January cut.


The index lines drawn indicate that when R=2.0, S=0.001 and C=100.0, then V=1.02 And, aligning R=2.0, V=1.02 it is found that Q=0.36 cu. ft. per sec. or 161.57 gal. per min.
HYDRAULIC RADIUS (R) IN INCHES
DIAMETER (D) IN INCHES
DISCHARGE (Q) IN GALLONS PER MINUTE
DISCHARGE (Q) IN CU. FT. PER SEC.
AXIS = PRODUCT OF R × S
VELOCITY (V) IN FT. PER SEC.
CONSTANT (C)
COEFFICIENT DEPENDING ON MATERIAL AND CONDITION OF INNER SURFACE OF PIPE
SLOPE OF PIPE (S)
Nomographic Chart
For Solving Hazen-Williams Formula
For Flow of Water in Pipes
$V = CR^{0.63}S^{0.54}0.001^{-0.04}$
$Q = AV = 4\pi R^2 V$
$R = D/4$
DONALD R. KEITH,
CIVIL ENGINEER,
DIVISION OF WATER, CITY OF COLUMBUS, OHIO
JANUARY, 1943

Directions for using chart: Place straightedge on "D" scale at pipe diameter in inches and on "S" scale at loss of head per foot of pipe. Determine point on "Axis" line where straightedge crosses. Then place straightedge on this point on the Axis line and at Constant "C" for the pipe in question. Determine point where straightedge then crosses Velocity "V" scale. Next place straightedge on this point on "V" scale and on diameter of pipe in inches on "D" scale. Read Discharge "Q" in cfs or gpm where straightedge crosses "Q" line.

The Editor's Comments

Engineer Collective Bargaining?

IS THIS the proper term for the praiseworthy effort currently being made in the Am. Society of Civil Engineers to do something for the rank and file of its members, which have long constituted the "democracy" of civil engineering, paying taxes in the form of dues, getting a certain satisfaction from the status of "belonging" which comes with the wearing of the Society's shield of blue and gold as the hallmark of approval, but aside from this just looking on, mostly, while the minority ruled (as in most democracies) and the younger members bowed to the "old guard" who has run the Society for the benefit of minority groups more often than in the interests of the majority.

Well, we don't think that "collective bargaining" is the proper term to be used in referring to the work of A.S.C.E.'s far-seeing Committee on Employment Conditions. We prefer some such term as "Professional Engineer Protection," or any other which effectively reflects what the Committee and the Society's Board of Directors is aiming to achieve—namely, safeguarding the professional status of the Society's members, while offering a respect-preserving means of advancing and protecting the member's economic and social position in a manner which will command equitable employer-employee treatment without having to sell his birthright through being forced into becoming a bedfellow with members of pressure groups which have brought to the term "collective bargaining" its present unsavory interpretation.

The Committee on Employment Conditions, with the very praiseworthy assistance of Society staff members digging up facts out in the field, interviewing employees and employers and Federal labor law authorities, and even being suspected of doing a certain amount of intelligent (shall we say—and professional) sleuthing, rendered its carefully studied report as presented by A. M. Rawn, chairman, to the Board of Directors in October, 1943. The report was accepted and approved. It was printed in full in the November issue of *Civil Engineering*, and deserves careful reading.

TIME Magazine saw in this report, and the Board's decision to activate it, one of the most constructive and far-reaching pieces of action that any professional organization has ever undertaken. It properly hailed the Board's decision as the most momentous in the 91-year history of the Society. We feel sure that the majority of the Society's members who do their own thinking and really know what the report recommends, agree with TIME'S editors. But, what has happened since?

The minority raised its voice loud—and far, with the result that the Board received demands from many quarters that it reconsider its actions of October. So Chairman Rawn and his committee were brought on the carpet in January and put up before the membership at large on the great stage of the A.S.C.E. auditorium to be shot at by a poorly informed and self-interested minority, for a three-hour session of questioning and floor debate. The stalwart chairman of the committee, even after long grilling sessions with the Board, looked as though he could take it—and did. Mr. Howard Peckworth, of the Society's headquarters staff, who did the all-important field work for the committee, came through with flying colors—meaning that he had the answers for some sharpshooters and gave these clearly, concisely.

At long last the "firing" reached the desultory stage at 5:30 p. m. and the vote was taken on the resolution that the Board reconsider its actions.

The resolution was lost by a vote of 120 against to 97 for passage. However, this vote cannot be considered to represent the opinion of the membership at large. Only 217 members voted and of this number the majority were from the N. Y. Metropolitan Section which had been thoroughly propagandized against adopting the "collective bargaining" plan, inasmuch as each individual Section has the choice of accepting or rejecting the plan.

Interestingly, only one Section has so far rejected the plan, and this one is to repeat the election because the result is charged to a misinterpretation. In one Section the local board assumed the responsibility of deciding that the proposal should not be put before the Section for a vote. If this be constitutional, we wonder how and why. Fifteen Sections have adopted the plan and a like number were in the process of consideration in January.

The way matters stand in this country now, labor laws are such that the professional man has been caught in between. As an individual he has almost no voice in matters pertaining to his employment and working conditions. He is subject to the requirements of the collective-bargaining law (Nat'l Labor Relations Act); and, on the other hand, the professional man enjoys none of the advantages which accrue to most other employees through the Fair Labor Standards Act. He is therefore subject to overtime work without the "Fair Standards" compensation rates. And, if he is dissatisfied with working conditions, rates of pay, etc., he can be told to go tell it to William Green or John Lewis. His only other alternative is to accept his situation as just another white collar worker or to establish his own group for collective bargaining in accord with the present labor law.

This is the situation which confronted the A.S.C.E. Committee on Employment Conditions and caused it to decide that it was time to do something about it, and caused the Board to put the suggested plan into operation and to assist with Society funds in its prosecution. Some have referred to the plan as a unionization movement, and unbecoming a professional society. Be that as it may, some can afford to abhor collective efforts and strut before the professional mirror, but the way it strikes us the employment conditions of today demand a method of *today* in order to cope with the situation as the Administration has developed it—since methods of "yesterday" no longer suffice. If the Am. Society of Civil Engineers (not un-noted for conservatism and regard for precedent) has taken the steps that it has, one may feel confident that more than individual effort is necessary for "Professional Engineer Protection"—not to mention the help needed by the sub-professional group and the Junior Members who make up the great rank and file of the Society.

We agree with TIME'S editors in their appraisal of the plan, and believe that the report of Rawn and his Committee on Employment, and the Board's decision to activate it, represents a high standard of service and an epoch-making decision in the interests of not alone every member in the Society, but of the engineering profession as a whole.

L. H. Enslow

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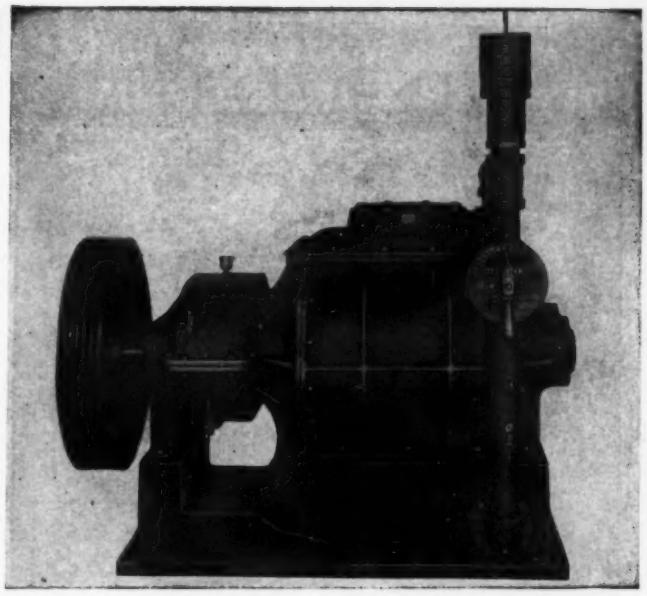

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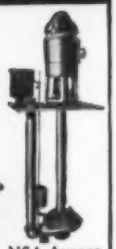
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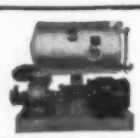
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MEETINGS SCHEDULED:

Feb. 17—BOSTON, MASS. (Hotel Statler).
New England Water Works Association. (Monthly Meeting.) Sec'y, F. J. Gifford, 613 Statler Bldg., Boston, Mass. (Next meeting March 16.)

March 16-17—ST. PAUL, MINN. (Lowry Hotel).
Minnesota Section A.W.W.A. Sec'y, R. M. Finch, Wallace & Tiernan Co., 416 Flour Exchange, Minneapolis, Minn.

March 23-24—TRENTON, N. J. (Stacy-Trent Hotel).
New Jersey Sewage Works Association. Treasurer & Acting Sec'y, Edward P. Molitor, Chatham, N. J.

April 11-13—PEORIA, ILL. (Hotel not selected).
Illinois Section A.W.W.A. Sec'y, H. E. Hudson, Jr., 912 W. Charles St., Champaign, Ill.

April 12—LEWISTON, ME.
Maine Water Utilities Association. Sec'y-Treas., Earle A. Tarr, Winthrop, Me.

April 13-14—INDIANAPOLIS, IND. (Hotel Antlers).
Indiana Section A.W.W.A. Sec'y, Charles H. Beckert, State Library Bldg. 402, Indianapolis, Ind.

April 17-18—LITTLE ROCK, ARK. (Marion Hotel).
Arkansas Water & Sewage Conference. Sec'y, Harrison Hale, 114 Chemistry Bldg., Fayetteville, Ark.

April 19-21—NIAGARA FALLS, ONT. (General Brock Hotel).
Canadian Section A.W.W.A. Sec'y, A. E. Berry, Ontario Department of Health, Parliament Bldg., Toronto, Ont., Can.

April 26-28—JACKSON, MICH. (Otsego Hotel).
Michigan Section A.W.W.A. Sec'y, M. N. Gerardy, Detroit Dept. of Water, Detroit, Mich.

April 27-28—UTICA, N. Y. (Hotel Utica).
New York Section A.W.W.A. (Spring Meeting.) Sec'y, R. K. Blanchard, Neptune Meter Co., 50 West 50th St., New York, N. Y.

May 5-6—BOZEMAN, MONT. (Hotel Baxter).
Montana Section A.W.W.A. Sec'y, H. B. Foote, Director, Div. Water & Sewage, State Board of Health, Helena, Mont.

May 8-10—GREENVILLE, S. C. (Poinsette Hotel).
Southeastern Section A.W.W.A. Sec'y-Treas., B. P. Rice, Healey Bldg., Atlanta 3, Ga.

May 12-13—OLYMPIA, WASH. (Olympian Hotel).
Pacific Northwest Section A.W.W.A. Sec'y, Wm. P. Hughes, City Engr. & Water Supt., City Hall, Lewiston, Idaho.

May 17—SPRINGFIELD, MASS. (Hotel Kimball).
New England Sewage Works Association. (Spring Meeting.) Sec'y, LeRoy W. VanKleeck, State Dept. of Health, Hartford, Conn.

May 18-19—COLUMBUS, OHIO (Hotels Fort Hayes & Chittenden).
Ohio Section A.W.W.A, Sec'y-Treas., L. J. Hoffman, City Water Works, 100 Municipal Bldg., Akron, Ohio.

June 13-16—MILWAUKEE, WIS. (Hotel Schroeder).
American Water Works Association (1944 Wartime Conference and Annual Meeting.) Executive Secretary, Harry E. Jordan, 500 Fifth Avenue, New York, N. Y.

June 16-17—SYRACUSE, N. Y. (Hotel Syracuse).
N. Y. State Sewage Works Association. Sec'y, A. S. Bedell, N. Y. State Dept. of Health, Albany, N. Y.

Oct. 12-14—PITTSBURGH, PA. (Hotel William Penn).
Federation of Sewage Works Associations, Exec. Sec'y, W. H. Wisely, Illinois Building, Champaign, Ill.

Here and There with Doc Symons

IN THE January issue of W. W. & S. appeared a review of last year's water supply developments, and in this issue appears a review of 1943 Sewerage Developments. Not to be outdone, we'd like to do our own review.

To begin with, it was a year ago today (as this is written) when the editor of this magazine first proposed to us that we should lay aside the test tube for the typewriter, and a week later we agreed to do so. Then followed several months involving frantic efforts to wind up the affairs of one position to become familiar with the tools of another.

In this past year we learned to use the editorial "we" in place of "I"; we learned to write death notices, death notices about men whose names were famous when, in knee pants, we "got underfoot" in our father's water plant; men like Alvord, Weston, Bahlman, Cook, Jordan, and others.

We learned to abstract and digest patents. There *is* a job. Of all the obtuse language in the world, the patent lawyer really has it. We learned to take manufacturers' releases sounding like a salesman's plug and rewrite them into something of a news story. We learned to review literature, catalogs and books on trains, in restaurants, at home, or commuting.

We wrote about a strike in the sewage plant in Buffalo, about substitute manhole covers, about water conservation and waste prevention, about "Blueprinting Now," about drinking water standards (as did a hundred others), and about meetings.

Yes, about meetings; we covered 17 of them in various parts of the midwest and the east, and met a host of friends and countless other persons we one day hope to call friends. We obtained an article on a new method for calculating B.O.D., saw the end of articles on civilian de-

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ONE CENT

This is the rate of fuel oil cost for these four 8-in. MORRIS Centrifugal Pumps driven by Murphy Diesel Engines at the new pumping station of the City of New London, Conn.

This exceptionally efficient installation has several additional important features and advantages:

Each pump, rated for 1750 gpm against 125 ft. total head at 1140 RPM will also deliver the same capacity against 145 ft. head at 1200 RPM. This allows for the loss through a future filter plant without any change in the installation

The installation now provides more adequate fire protection to the higher sections of the city, thus reducing the fire hazard

The MORRIS engineers have met the required conditions without the use of gears between engines and pumps, thereby greatly simplifying the installation.

These advantages, together with the high efficiency of the MORRIS pumping units, make this plant of outstanding interest. The 80-year MORRIS experience in designing centrifugal pumps for every requirement can help give YOUR municipality a dependable, efficient plant for handling water supply, sewage, or drainage.

MORRIS MACHINE WORKS
Baldwinsville, N. Y.

MORRIS
ESTABLISHED 1864

Export Office
50 Church Street
New York 7, N. Y.

CENTRIFUGAL PUMPS

fense, learned that chlorine cylinders periodically become short because users fail to send them back when empty.

We saw our editor write one of the great editorials of the year entitled "Some Bad Eggs Get Fryed." We saw the efforts of A. M. Rawn bear fruit in producing a WPB order for sewerage, an order which was understandable and sensible in spite of the legal verbiage with which, against his wishes, Mr. Rawn's ideas had been clothed.

We learned, too, what a terrific job Ye Editor has shouldered in past years in producing the annual Reference and Data Issue of *Water Works and Sewerage*, an issue that at least one of our proteges finds of "inestimable value" in his work with the Corps of Engineers.

We came face to face with the problem of making one word do the work of two because there isn't enough paper to go around to the publishers and fight a war too. We wrote our first editorial, our first, that is, in this magazine, and found when it was printed that a typographical error had created a severe breach of grammar. And then we began writing this column.

It was our idea that this column would contain short items of interest to the men in this field; that men in the field would find that they, too, had little items that should appear in "Here and There." We hoped to receive some comment in the mails as to whether our column was read or not, what the reader liked or didn't like. We hoped to editorialize a bit. We hoped to have questions sent to us for answer. Yes, we hoped!

Well, we have had four letters since August; one compliment, one question, one approval, and one request. We thanked the compliment, answered the question, printed the approval, and are considering the request.

Yes, in 1943 we learned a great many things, but we'd still like to know if this column merits the hopes we had for it. "There's a war going on, you know" and far be it from us to waste paper on a feature that does not serve the readers of *Water Works and Sewerage*.

* * *

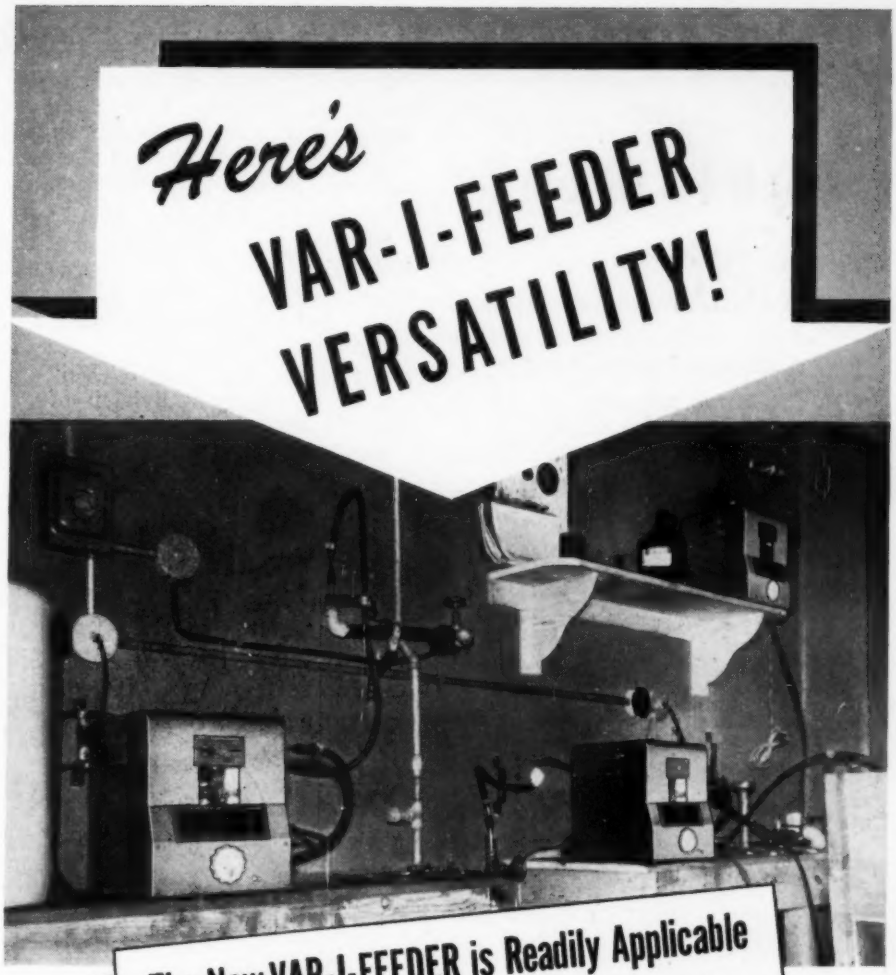
"Water Peddlers, U. S. A.," from Amer. Water Works and Electric Co.'s "Water"—In India water peddlers are an interesting sight to our soldiers, but on Kerr Island, Ill., water peddlers don't cause a second

glance. There are 250 cabins on the island and only 25 have water facilities of their own. Water peddling started six years ago by a man who has lived on the island for 20 years. Before 1937 each family had to solve its own water problem but this man has solved their problems and built up a flourishing business. He averages 150 barrels weekly at 25 cents per barrel.

In a country newspaper for which we once wrote a bit there always appeared one column that interested us. It was titled "News Notes from Brushy Bend," and we never write this particular section of our "letter" without thinking of that column! Our News Notes this time are short. . . . Al. Morris, of the advertising department of Dorr Co., was inducted into the Marines as a private and is now in boot training at Parris Island. . . . Pete Wisely is going to do special lecturing at the University of Illinois in Civil Engineering. . . . Walter Kunsch of Danbury, Conn., succeeded Pete at the Champaign-Urbana Sewage Plant. . . . Johnny McDonald, erstwhile Supt. of Sewage at Springfield, Mass., is at Camp Davis as a lieutenant. We know the Army needs good men, but we are sorry to see him leave Springfield, for he was writing us another article (his first appears in this issue).

* * *

At the N. Y. Section meeting in Binghampton last October, E. J. Rowe, Supt. of Water of Wellsville, appeared on the program between two distinguished gentlemen. Mr. Rowe said by way of introduction, "The position assigned this paper reminds me of a conversation heard at a social function, when a hungry-looking man eating a sandwich was asked, 'What kind of a sandwich are you eating?' The hungry man replied, 'A very thin slice of nothing between two thick slices of bread.'" Mr. Rowe likened his paper to that sandwich filling. Nothing could have been further from the truth. We can't remember what those two thick slices of bread were about, but we haven't forgotten what Rowe's "thin slice of nothing" was devoted to. Rowe talked about "The Public Utility Goes to School." His paper told how children were taught in the schools about the water plant, its work, its problems, and its service. That paper was published in the December issue of the Journal AWWA. We cannot recommend too highly that you read the paper. It will stimulate your interest in a possibility that will repay you manyfold.



Wired with Chem-Feed standard connections for control from small water meters, three stock Var-I-Feeders were shipped to the above illustrated job.

The customer's large, (8x3) Sparling Compound water meter, with a maximum capacity of over 1000 gallons per minute, had been on duty for years, and was handling average flows of over 500 gallons per minute. For installation in the Sparling, Chem Feeds, Inc. furnished a special contact switch for sending electric time interval signals to the chemical feeding plant which is located 300 feet from the meter pit.

Both Var-I-Feeders shown are proportionally paced by the water flowing through the meter, so as to feed hypochlorite solution for sterilization of the water supply, and glucosite, for corrosion control, into the customer's water piping system. Although both units are automatically flow responsive, Finger-Tip-Control allows ready adjustment by the operator, thus providing immediate changes in the sterilization or corrosion feed at will. A spare unit is shown on the storage shelf ready for any other emergency chemical feed operation or for standby to the two feeders now in use.

Made in both stationary and portable models, The Var-I-Feeder comes both as a constant rate or proportional type controlled by water meter.

Ask for Chem-Feeds Bulletin No. 77 To-Day!

CHEM-FEEDS, Inc.

77 RESERVOIR AVENUE, PROVIDENCE 7, R. I.

MANUFACTURERS' and EQUIPMENT News

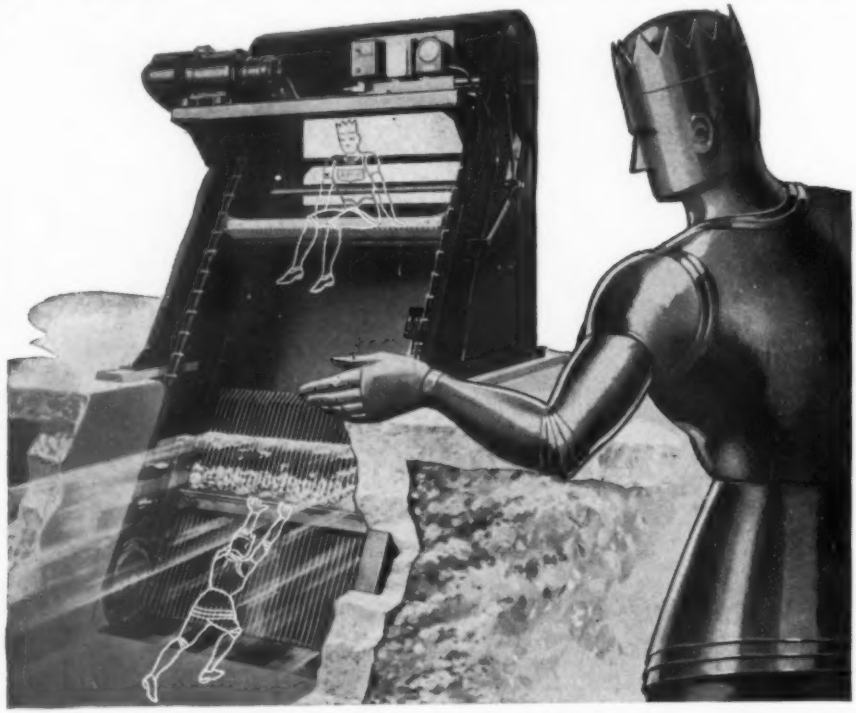
Omega to Builders

H. S. Chafee, treasurer of Builders Iron Foundry, Providence, R. I., and L. E. Harper, president of Omega Machine Co. of Kansas City, Mo., announced a consolidation whereby Omega becomes a wholly owned subsidary of Builders Iron Foundry. Mr. Harper continues as president and director of Omega and the company will continue at its present address, 3409 E. 18th St., Kansas City.

Builders Iron Foundry, one of the real old New England firms, was established in Providence in the year 1820. Builders' comprehensive line of flow meters, controllers, gauges, etc., is now distributed by Builders-Providence, Inc., a division of the parent company.

The Omega Machine Co., established in Kansas City in 1928 by Mr. E. E. Harper, has developed a line of related products, including both volumetric and gravimetric dry feeders, a solution feeder, and continuous lime slakers. Under the leadership of Mr. L. E. Harper, Omega has made noteworthy strides and during the past few years has handled an expanding volume of orders for war plant facilities, necessitating the purchase of new and larger quarters in 1942. Still larger manufacturing facilities will now be available to their rapidly growing business.

This merger brings together Builders-Providence, Omega, and Builders' associate company, %Proportioneers, Inc.%, three fine organizations, each a specialist in its own field. %Proportioneers%, as engineers and manufacturers, produce a complete line of liquid chemical feeders employed in the treatment of water and sewage, as well as proportional devices for industrial process blending and treating.



SCREENINGS REMOVED... FROM 550 MGD OR .1 MGD

There is no limit to the range of flows which can be handled efficiently and economically by Rex Mechanically cleaned bar screens. Rex Mechanical Engineering—Rex M. E.—has developed a full line of screens to suit the unusual as well as the usual requirements. In some instances, screenings are removed from the sewage flow 30 feet below grade and are elevated and discharged several feet above grade. This means that screenings can be removed BEFORE PUMPING. Rex M. E. has paid particular attention to the requirements for the small plant. This "M I" type screen is engineered to give the small plant all the advantages in design and construction that are found in large plant units. We would like to put Rex M. E. to work on your problem—let us show you what he can do. Chain Belt Company, 1610 West Bruce Street, Milwaukee 4, Wisconsin.

REX SANITATION EQUIPMENT

Triturators • Bar Screens • Tow-Bro Sludge Removers • Slo-Mixers
Aero-Filters • Rapid Mixers • Grit Collectors and Washers

CHAIN BELT COMPANY *OF MILWAUKEE*
Member of the Water and Sewage Works Manufacturers Association, Inc.

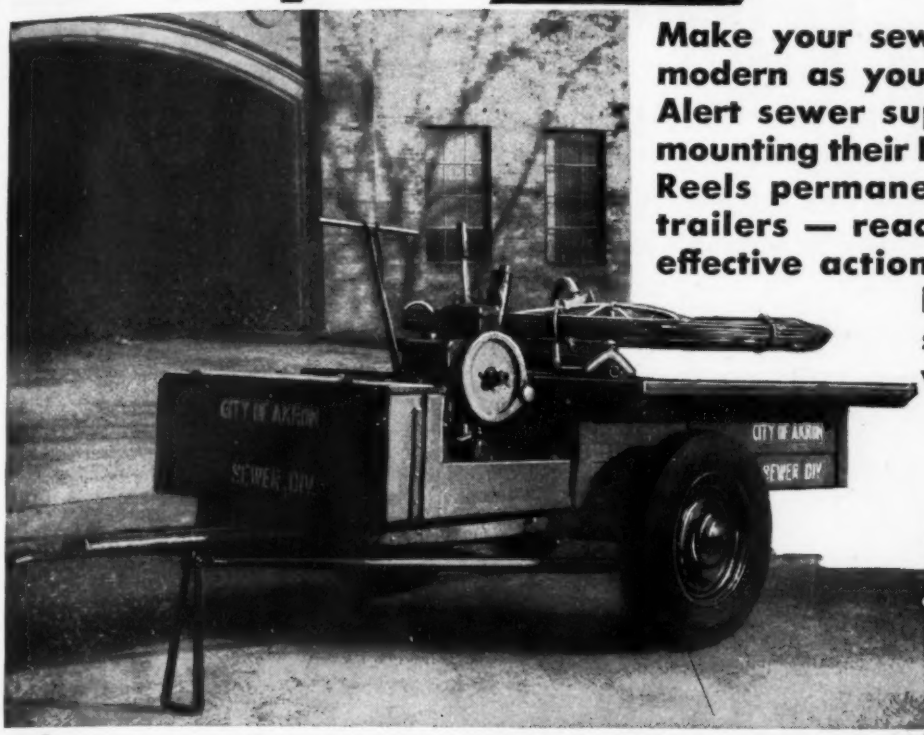
Walter Parker, of PEMCO, Died Suddenly

Walter H. Parker, V. P. in Charge of Manufacturing, Pittsburgh Equitable Meter Co., died suddenly on Dec. 28 at his home following pneumonia. A captain in World War I, he was honored with a citation for development of a synchronizing principle of firing bullets between the blades of aeroplane propellers. In the present war, he has been active in the development and manufacture of medium caliber armor-piercing shot.

Walter H. Parker

Mr. Parker was a graduate of No. Carolina State College and, prior to becoming associated with PEMCO in 1929, was Chief Engr. for the Fry Equip. Co. of Rochester, Pa. Mr. Parker is survived by his widow, two brothers and one sister.

Ready to Go Right Now!



Make your sewer department as modern as your fire department. Alert sewer superintendents are mounting their FLEXIBLE "EZY" Rod Reels permanently on trucks or trailers — ready for immediate effective action. Be prepared to handle emergency stoppages quickly with FLEXIBLE tools.

FLEXIBLE SEWER ROD EQUIPMENT CO.
9059 VENICE BLVD.
LOS ANGELES 34, CALIF.
401 BROADWAY, NEW YORK 13, N.Y.
PICKWICK BLDG.
KANSAS CITY 6, MO.

MADE . . .

. . . to your requirements

We design and cut bevel, spur, ring, miter, worm, herringbone and other types of gears for every branch of industry. Sizes range from ½" up to many feet in diameter and materials include both ferrous and non-ferrous alloys. Write today for the Earle Gear Booklet 42-G which contains full, detailed information.

THE EARLE GEAR & MACHINE CO.
4725 Stenton Avenue, Philadelphia, Pa.

EARLE GEARS

NEW!

The

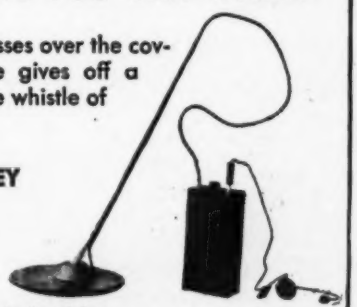
Bob White

ELECTRONIC

BOX LOCATOR

LOCATES ALL METAL UTILITY SERVICE BOXES AS FAST AS YOU CAN WALK!

When the loop aerial passes over the covered box, the earphone gives off a signal that sounds like the whistle of of a BOB WHITE.



SAVES TIME and MONEY
EASY TO OPERATE
SIMPLE TO HANDLE

Write for details

Manufactured by

FERGUSON & PASCOE
11 HILL STREET, NEWARK 2, N. J.

"BLUEPRINT NOW"

That's the official slogan of the National Committee on Water and Sewage Works Development. Their objective is to get post-war plans out of the "talking" stage. When the war is over and the men come home, they will look to their local communities for help in earning a living. It is our very real obligation to these men to prepare *now* detailed plans and specifications for post-war projects so that construction can be started without delay.

MATHEWS HYDRANTS
400 CHESTNUT STREET, PHILADELPHIA, PA.
ESTABLISHED IN 1903
Made by R.D. WOOD Company
MANUFACTURERS OF SAND SPUN PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES

M. B. Tark, Link Belt's Pioneering Veteran Retires

M. B. Tark, formerly in charge of design and application of sewage treatment and water purification equipment produced by Link-Belt Co., has retired from active service, having reached the retirement age under the company's retirement plan the end of last year. Mr. Tark was one of the country's stalwart pioneers in introducing mechanical equipment into the sewage treatment field. He had a number of inventions and improvements in such equipment to his credit. Perhaps the best known, for the longest time, is the Tark Revolving Fine Screen for removing suspended solids from sewage and industrial wastes. These screens have given long and satisfactory service at many places, the most important installation being the great battery of Tark screens at the Milwaukee Activated Sludge Plant.

"M. B." has many good friends of long duration in the Sanitation Field and he will long be remembered for his painstaking and conscientious dealings with the sanitary engineering profession.

This branch of the company's work will continue to be under the immediate direction of George M. Sharer, Eastern Divisional Manager for materials handling machinery, with headquarters at the Philadelphia plant.

Penn. Salt Announces Retirement of N. E. Bartlett

L. H. Brandt Joins Technical Service Staff

N. E. Bartlett retired as Vice Pres. of Pennsylvania Salt Mfg. Co. on Dec. 31, 1943. Mr. Bartlett, a native of Easton, Md., started with the Salt Co. in Nov., 1894, as a lye salesman in the Chicago office. About thirty years ago he came to the Phila. office as special sales agent and in 1925 was made Gen. Mgr. of Sales and, in 1928, vice president. An "oldtimer" and member of many organizations

N. E. Bartlett

L. H. Brandt

EDSON
DIAPHRAGM PUMPS
Hand Sizes 2", 2½", 3", 4"
Power Sizes 3" and 4"
Open Discharge or Force Pump
Edson Special Suction Hose
Red Seal Diaphragms
Strainers and Foot Valves
Hose Spanners—Adapters
THE EDSON CORPORATION
Main Office and Works: 49 D St. South Boston, Mass.
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ANTHRAFILT
A Filter Medium For All Purposes
ANTHRACITE EQUIPMENT CORP.
101 Park Ave. New York
H. G. Turner Research Engineer
STATE COLLEGE, PA.

in the chemical industry "Ned" Bartlett has been well known. He is retiring to his country home on Miles River, just outside of Easton, Md., after a long and successful career in the chemical industry.

L. H. Brandt, Ch.E., formerly with the National Ammonia Division of duPont, has joined the Technical Service Dept. of the Pennsylvania Salt Mfg. Co., according to an announcement by L. L. Hedgepeth, Mgr. of Tech. Serv. Mr. Brandt was educated at Dennison and Ohio State Universities, receiving his Ch.E. degree from the latter institution in 1938 and his bachelor's degree from the former in 1929. In his new position Mr. Brandt's services will be devoted principally to rendering assistance to heavy chemical users.

George B. Beitzel, V. P. in charge of sales, has announced that the company has divided the New York territory. Henceforth New York City, Long Island, Westchester and Putnam Counties in N. Y. and Fairfield, New Haven and Middlesex Counties in Conn. will be covered by F. G. Rodenburgh while Charles A. McCloskey will cover northern New Jersey, Connecticut and the eastern half of New York State except as noted. Both men will maintain headquarters in the company's New York office.

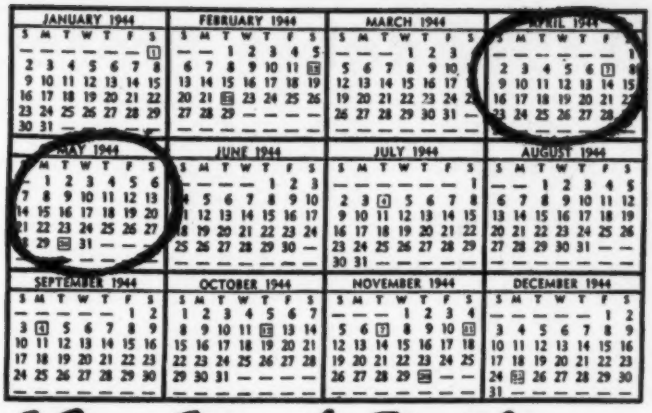
Water and Gas Equipment Sales Co. Incorporates

Mr. Charles J. G. Haas, for many years a representative of the Mueller Co. of Decatur, Ill., both on the road and in the New York Sales Division, has announced the formation and incorporation of the Water and Gas Equipment Sales Co., of which he is president. Mr. Haas' company which is located at 29 Broadway, New York 6, N. Y., is preparing an extensive sales campaign for the purpose of selling Water Works, Gas, Sewerage, Plumbing, Heating, Electric Equipment and Supplies on a commission basis.

Hooker Sales Appointments

Hooker Electrochemical Co. has announced the assignment of Thomas H. Trimble as its sales representative in the Eastern Middle Atlantic territory with headquarters at the New York office, Lincoln Bldg., 60 E. 42nd St. Mr. Trimble has been associated with the company for eight years, chiefly in the upper N. Y. State and western Pa. territory.

Mr. Ralph E. Davis has been ap-

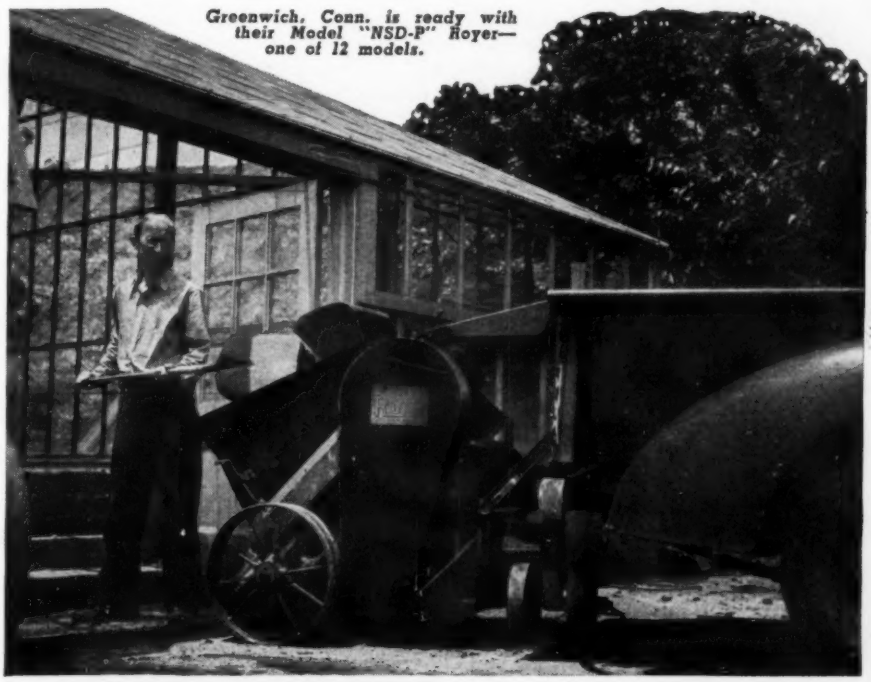


Only

A Few Months Until Victory Gardening Starts!

Be ready with a Royer to meet local demands for disintegrated sludge. Properly prepared sludge is beneficial to vegetable and field crops, trees, shrubs and grass. Shortage of high strength chemical fertilizers will increase demands for sludge during the coming season. Too, what high strength fertilizer is available can be "stretched out" by the addition of sludge.

Royer Sewage Sludge Disintegrators reduce sludge to pea size particles that quickly yield nutrition to plants, aerating it and removing sticks, stones and trash at the same time. They quickly return their cost by eliminating expense of sludge disposal and frequently show a worthwhile profit for sewage treatment commissions or departments. Send for "Sewage Sludge Utilization Datalog."

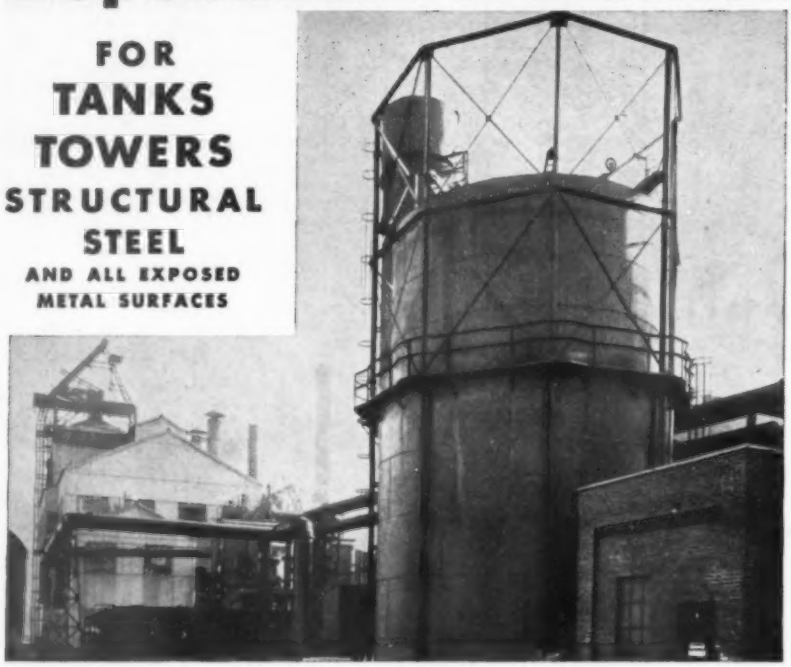


Greenwich, Conn. is ready with their Model "NSD-P" Royer—one of 12 models.

THE ROYER FOUNDRY & MACHINE CO.
170 PRINGLE ST., KINGSTON, PA.
PIONEERS IN THE SALVAGE OF SEWAGE SLUDGE

Dependable Protection

FOR
TANKS
TOWERS
STRUCTURAL
STEEL
AND ALL EXPOSED
METAL SURFACES



Reilly *Coal Tar Paints*

REILLY COLD APPLICATION NO. 5: Designed especially for use on tanks and other metal which is to serve under ground or under water; also an excellent water-proofing agent for concrete.

REILLY COLD APPLICATION NO. 40: Designed especially for use on tanks, structural steel and other metal surfaces exposed to the atmosphere and to corrosive gases.

REILLY COLD APPLICATION No. 50: Designed especially to withstand erosion and abrasion, and the action of either fresh or salt water.

REILLY PIPE ENAMEL: For dependable protection—inside and out—on steel water lines.

Complete information on these products and other REILLY Protective Coatings will be sent on request.

Reilly COAL TAR PRODUCTS

17 Plants
TO SERVE
THE NATION

REILLY TAR & CHEMICAL CORPORATION
Merchants Bank Bldg., Indianapolis 4, Ind.
500 Fifth Ave., New York 18, N. Y. — 2513 S. Damen Ave., Chicago 8, Ill.

Reilly **Protective Coatings**

Style 705 MERCURY FILTER CLOTH

Designed for Sewage and Disposal Plants

This all wool Mercury Filter Cloth is made from specially processed wool. Our 30 years of experience have proven that this wool withstands deterioration better and longer than other filter fabrics. Send us dimension of fabric you now use—we will be pleased to submit samples, price and full particulars.

Mercury

TECHNICAL CLOTH AND FELT CORPORATION ★ 1265 Broadway, New York, N. Y.

pointed sales representative in the territory formerly covered by Mr. Trimble and will have his headquarters in Niagara Falls.

N. Y. Sales Office for Clow and Nat. C. I. Pipe

James B. Clow and Sons, Chicago, and National Cast Iron Pipe Division, Birmingham, have announced the opening of a sales office at Room 434, 2 Rector St., New York 6, N. Y. The office will be under the direction of Mr. Henry E. Skibbe, Manager.

Col. Rockwell Returns to Private Business

Col. W. F. Rockwell, Pres. of Pittsburgh Equitable Meter Co. and Merco Nordstrom Valve Co., has just

announced his resignation as Director of Production for the Maritime Commission, in order to devote full attention to the manufacturing details of war work being done by his several interests.

In announcing his resignation from the Maritime Commission Col. Rockwell states, "the recent untimely death of Walter H. Parker, our Vice Pres. in charge of manufacturing, hastened the need for my return to active participation in business; but my resignation to Admiral Land, chairman of the Maritime Commission, was submitted only when it became apparent that the shipbuilding program was 'over the hump' . . . ."

The Colonel has also recently been elected to the boards of the First National Bank and Peoples-Pittsburgh Trust Co. of Pittsburgh.

H. K. Porter Opens Enlarged N. Y. Office

H. K. Porter Co., Inc., of Pittsburgh, Pa., has just announced the opening of an enlarged New York and Export Office at 50 Church St., New York, N. Y. This new office will serve as an eastern center for an expanding business in locomotives, process equipment and pumps.

Thomas MacLachlan has been

named general manager in charge. He was formerly New York manager of Vulcan Iron Works of Wilkes-Barre, Pa.

R. G. Newell, who managed the New York office of Quimby Pump Co.

Thomas MacLachlan

before its acquisition by Porter, will direct the activities of the Quimby Pump Division of Porter in New England and the New York district. Earl M. Bardo, formerly with Robinson Mfg. Co., will represent Porter chemical process equipment in the same territory.

Simplex Valve Appoints New Reps.

Announcement has recently been made by Simplex Valve & Meter Co. of Philadelphia of the appointment of several new sales representatives as follows:

Carl F. Noel, 428 13th St., Oakland 12, Calif., covering Northern California and Southern Oregon; Case Eng. Co., 457 N. Kingshighway, St. Louis, Mo., covering Southern Illinois and Eastern Missouri; R. S. Stover, 212 Kresge Bldg., Marshalltown, Iowa, covering Nebraska and Iowa; "Jim" Clarke Agency, 245 E. Keefe Ave., Milwaukee 12, Wis., covering Wisconsin and Minnesota; and R. O. Luchtenberg, Box 65, Columbus, Ohio, covering Southwest Ohio.

Punch-Lok Hose Clamp

The Industrial Products Sales Division of B. F. Goodrich Co. has received distribution rights to the Punch-Lok hose clamp and method of applying it to hose of all types, electric cable, and wire or textile rope. The Punch-Lok hose clamp is a mechanical device used to connect various kinds of male and female fittings, special nipples, menders or ordinary pipe to a hose. The connection being stronger than the hose itself, vibration or rough handling will not loosen it when once locked. Clamps may be obtained up to 48 inches in diameter with a portable tool weighing only 2½ pounds for

SMITH EQUIPMENT

THE A. P. SMITH MFG. CO. EAST ORANGE, N.J.

Symbol of Quality Since 1889

A NAME TO REMEMBER

When you want good Water Works Equipment

It is an easy name to remember and also one worthwhile. Our experience gained in over 50 years of service enables us today to stand ready to help you get the best water works equipment available. Our men are experts in their profession and their skilled craftsmanship is known the world over.

OTHER SMITH PRODUCTS
Valves and Hydrants — Valve Inserting Machines — Tapping Sleeves — Tapping Valves — Hat Flanges and Water Meters
Write for Catalog

When You Need Any Of The Following

WATER METERS — disc, current, disc-compound, current-compound.	Write for Booklet 42MF
VALVES — HYDRANTS — for heavy and high-pressure service.	Write for Booklet 42VH
TAPPING AND INSERTING VALVES, machines and accessories.	Write for Booklet 42M
CORPORATION AND CURB COCKS, PIPE CUTTERS, REPAIR SLEEVES, REMOVABLE PLUGS, INDICATOR POSTS, ETC.	Write for Booklet 42 Misc.

Branches
7 So. Dearborn St., Chicago, Ill.
409 Texas St., El Paso, Texas
315 N. Crescent St., Flandreau, S. D.
901 Wm. Oliver Bldg, Atlanta, Ga.
Thirteenth & Broadway, Oakland, Calif.
524½ First Ave. S., Seattle, Wash.
1317 Oakley St., Orlando, Fla.

THE A. P. SMITH MFG. CO., EAST ORANGE, N. J.

ZECO GREENSAND ZEOLITE

ZECO and HI-ZECO Greensand Zeolite for water softening, filtration and iron removal. ZECO Manganese Zeolite for iron and manganese removal. COREXITE mineral for corrosion control and water stabilization.

ZEOLITE CHEMICAL CO.
Sales Office: 141 Cedar St., New York, N. Y. Factory: Medford, N. J.
Pioneer Producer of GREENSAND ZEOLITE MINERAL

BAILEY METERS AND CONTROLLERS

FOR SEWAGE TREATMENT AND WATER SUPPLY . . .

● Venturi Tubes, Weirs, Flumes, Nozzles and other primary elements; Mechanically and Electrically operated Registers and Complete Automatic Control Systems.

BAILEY METER COMPANY
1072 IVANHOE ROAD ● CLEVELAND O.
Bailey Meter Co. Ltd., Montreal, Canada

DEPENDABLE • EFFICIENT PUMPING FOR LOW COST

SEWAGE DISPOSAL and WATER SUPPLY

Scores of municipalities and industries throughout the country rely on the Johnson Right-Angle Gear Drive for use in pumping operations. This drive was designed as a "connecting unit" between the deep-well turbine or sewage pump and the power unit. Reduces shut-downs; gives 24 hour efficient service; lowers pumping costs.

JOHNSON *Right Angle* GEAR DRIVE

GET COMPLETE DETAILS

through the local representative of Pump and Engine Manufacturers. These drives are manufactured in a wide range of sizes to meet the specifications for most applications — Sewage Disposal; Water Supply; Fire Fighting; Flood Control, etc. Write for Catalogue No. 12.

★ DEPENDABLE
★ ALWAYS ON DUTY
★ LOW COST OPERATION
★ OCCUPYS LITTLE SPACE
★ FULLY ENCLOSED
★ UNUSUAL LONG LIFE

JOHNSON GEAR & MANUFACTURING CO., LTD.
MAIN OFFICE AND WORKS: BERKELEY, CALIFORNIA

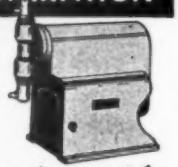
SAVE *with* TENNESSEE CORPORATION Ferri-Floc

Write today for actual case histories of plants now using the ideal ferric coagulant.

TENNESSEE CORPORATION
Atlanta, Georgia Lockland, Ohio

..for ACCURACY and TROUBLE-FREE OPERATION

INSIST ON THE WILSON PULSAFEEDER



Engineered and Manufactured by

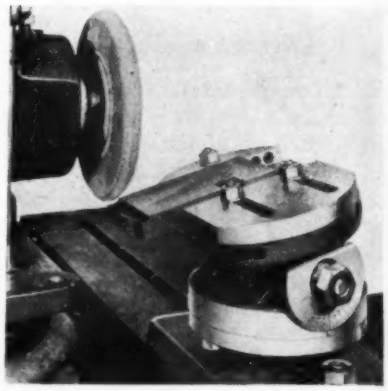
WILSON CHEMICAL FEEDERS, INC.

203 CLINTON STREET BUFFALO 4, N. Y.

applying the clamps. Inquiries concerning this new item may be directed to the B. F. Goodrich Co., Akron, Ohio.

New Chaser Grinding Fixture

A new universal chaser grinding fixture has been introduced by The Oster Manufacturing Co. of Cleveland, Ohio, manufacturers of pipe



and bolt threading machines, turret lathes, and torch-cutting machines for pipe welders.

The new chaser grinding fixture is designed for easy mounting on the table of any conventional tool and cutter grinding machine, and is adjustable for any throat or rake angle desired. It will hold all sizes, makes, and types of dies or chasers, and has many advantages recommending its use.

Plastic Stock Bin Card Holders

Neat stockroom bin card holders made of ivory plastic, available in a variety of shapes and sizes for immediate shipment, are the latest addition to the line of the Plastics Division of Hollywood Athletic Co. Stock widths of 5/8, 7/8 and 1-7/16 in. may be had in any of the stock lengths of 3, 4 or 5 in.

Applicable to any flat surface, on wood or on metal, they consist of the plastic holder itself, an insert tab on which description of the article may be typed, and a covering sheet of transparent plastic. Complete descriptional folder, together with prices, will be sent upon inquiry to Plastic Division of Hollywood Athletic Co. at 211 E. 7th St., Los Angeles 14, Cal.

Lithcote—Ferric Chloride Resistant Covering

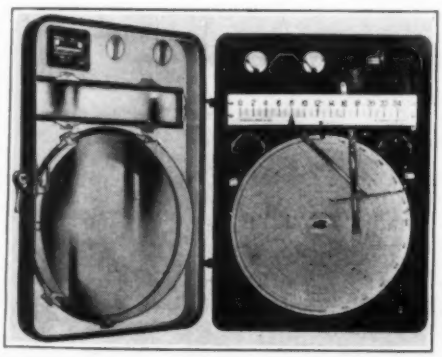
A new type of organic material based on synthetic plastics is polymerized or cured directly on the sand-blasted surface of any metal. This material, called Lithcote, manufactured by Lithgow Corporation, Chicago, shows extreme resistance to ferric chloride and other salt solutions, and is highly protective to metals submerged in acid solutions of various strengths.

Because of the character of the material, it is, of necessity, cured only by means of special equipment either at the main plant of the company, or in the field, with portable equipment and trained crews.

A series of tests has been completed over intervals as long as 50 months, and results have been tabulated and interpreted. A copy of the report covering these tests and the application of this material to tanks and equipment in water and sewage plants may be obtained by writing to the Lithgow Corporation, 333 W. 40th Place, Chicago, Ill.

Bristol's New Model Pyromaster

The Bristol Co. has announced a redesigned Pyromaster Self-Balancing Potentiometer. The new model



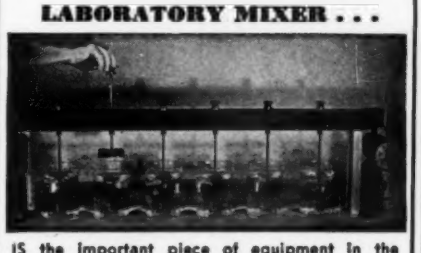
431 has several improvements over previous models, particularly as regards flush mounting case, heavy-duty pen-drive motor, indicating scale, stepping relays and slide wire, and standard cell type of manual standardizing circuit. Bull. P1200 describes in detail the construction, operation, and application of the new design and is available on request from the Bristol Co., Waterbury 91, Conn.

HILL-HUBBELL STEEL PIPE PROTECTION HILL-HUBBELL STEEL PIPE PROTECTION HILL-HUBBELL STEEL PIPE PROTECTION HILL-HUBBELL STEEL PIPE PROTECTION HILL-HUBBELL STEEL PIPE PROTECTION HILL-HUBBELL STEEL PIPE PROTECTION HILL-HUBBELL STEEL PIPE PROTECTION HILL-HUBBELL STEEL PIPE PROTECTION HILL-HUBBELL STEEL PIPE PROTECTION HILL-HUBBELL STEEL PIPE PROTECTION HILL-HUBBELL STEEL P

SYNONYMOUS!

GENERAL PAINT CORPORATION
HILL, HUBBELL & CO. • Division • Cleveland, Ohio
• EXPORT OFFICE: SAN FRANCISCO, CALIFORNIA, U. S. A. •

THE Phipps & Bird LABORATORY MIXER . . .



IS the important piece of equipment in the Modern Water Works Laboratory. Now being used by leaders in water works research. Many superintendents and chemists have been able to reduce their chemical costs by the control of chemical dosages with this mixer. Write for literature.
PHIPPS & BIRD, INC. Richmond, Va.

IMPROVED JOINTING COMPOUND
Tegul-MINERALEAD
for Bell & Spigot Main

- Sulphur base; quick sealing, speeding laying and backfilling.
- 10 lb. ingot form, easily handled, stored and shipped. Impervious to rain. Cannot change composition.
- Makes permanently tight joints. Goes 3 to 5 times as far as lead, helping conserve a strategic war metal.
- For money-saving information, write

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NOW is the time to investigate
LOWER VACUUM FILTRATION COSTS
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THE FISHER M-SCOPE
ELECTRONIC BOX-LOCATOR
SUCCESSFULLY USED SINCE 1936

LOCATE BURIED VALVES, STUBS, METER BOXES, DRIP BOXES, COVERED MANHOLES, SEWER CLEAN-OUTS, ETC., WITH THE FISHER M-SCOPE ELECTRONIC BOX LOCATOR AT WALKING SPEED. DOES AWAY WITH THE SLOW OLD FASHIONED DIP-NEEDLE METHOD.

LIBERAL TRADE-IN ALLOWANCE ON YOUR OLD DIP-NEEDLE.

Ask for Latest FREE 16 Page M-Scope Booklet On Pipe Finder, Leak Detector and Box Locator

FISHER RESEARCH LABORATORY
1961 University Avenue Palo Alto, California

Green Appointed Asst. to Mgr. "G. E." Motor Div.

E. A. Green has been named general assistant to the manager of General Electric's motor division. A native of Kennett Square, Pa., Mr. Green was graduated from Swarthmore College in 1924 and in August of the same year joined "G. E." as a student engineer. In 1927 Green joined the industrial division and, in 1936, was transferred to the motor division. Mr. Green has been active on the Company's priorities committee and has performed many special assignments in the past year until his recent appointment.

Charlie Richardson Elected Vice-President of Builders-Providence

Only a year ago these columns carried the story of Charles G. Richardson's fortieth anniversary

Charlie Richardson

with Builders Iron Foundry and Builders-Providence. Now comes word that "Charlie" has been elected vice-president of Builders-Providence.

This action comes as a fitting reward to a man who through four decades has been of service not only to his company in particular but to the water and sewage works field in general. Active in the Am. Soc. C. E., the Amer. Water Works Assn. and the Sew. Works Federation, Charlie Richardson has a host of friends in this profession, friends who are indebted to him for help rendered, and friends who wish him well in his new capacity of vice-president of Builders - Providence, Inc.

In the Water and Sewage Works Mfr's. Assn., Charlie Richardson holds the position of Chairman of the Executive Committee of the Water Division.

Robert A. Carr Becomes Dearborn's President

At the 49th annual meeting of the stockholders of Dearborn Chemical Co. of Chicago, two new positions were created—Chairman of the Board, to which the president, Mr. Robert F. Carr, was elected, and Chairman of the Executive Committee, to which Mr. George R. Carr, formerly vice president and general manager, was elected. At the directors' meeting, Mr. Robert Adams Carr, formerly vice president, was elected president.

Diamond Appoints Diaz Supervisor

According to an announcement recently by Diamond Alkali Company, Mr. Raymond Diaz, formerly treasurer of Benner Chemical Company, Chicago, joined the Diamond organization as of January 1st as Supervisor of District Offices of the Diamond Alkali Sales Corporation.

Huck Now Clayton Adv. Mgr.

Clayton Manufacturing Co., Alhambra, Cal., manufacturers of hydraulically-operated control valves, announced in December of 1943 the appointment of Larry E. Huck as manager of their valve division's advertising and sales promotion departments.

Prior to his association with Clayton, Mr. Huck for many years was connected with Crane Company's advertising and sales promotion departments with headquarters in Chicago.

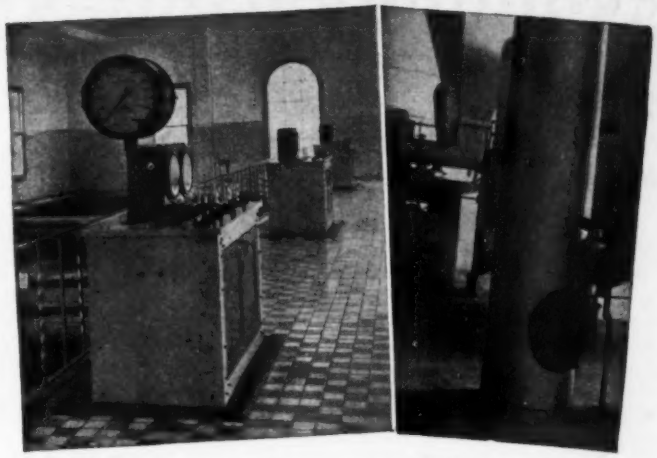
W. J. MacEvoy Sales Mgr. Sika Chem. Co.

Sika Chemical Corp. of Passaic, N. J., manufacturers of Plastiment and Sika waterproofing compounds, has announced the appointment of Warren J. MacEvoy as Sales Manager. Mr. MacEvoy was formerly Vice President and Gen. Supt. of the MacEvoy Shipbuilding Corp. of Savannah, Ga. Mr. MacEvoy is well known in the New York area for the many buildings he has constructed in the past twenty-five years in New York, New Jersey, and Connecticut.

Philadelphia Gear Works Organization Changes

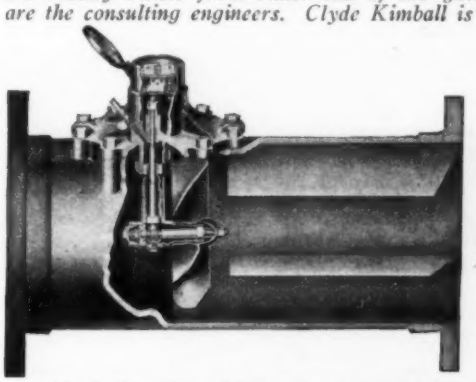
Effective Jan. 1, 1944, the Philadelphia Gear Works announced the following changes in organization: James N. Morrell became sales manager, Limitorque Valve Control Div.; Thomas V. Withington relinquished

SPARLING MAIN-LINE METERS



50 Installations at Beverly Hills, California

Since 1924 we have supplied the water department of the movie moguls with main-line meters. The one above, installed in 1937, is a 16-inch meter operating a Town Clock Rate of Flow Indicator. The dual faces are readily visible from either end of the gallery. Taylor and Taylor are the consulting engineers. Clyde Kimball is superintendent.



Types and Sizes for Main-Lines from 2-inch up.

Each Sparling Meter is a complete totalizing unit—the propeller revolving in the flow is geared directly to the Totalizer, as shown. Flanged, Bell & Spigot and Threaded tube-mounted meters; also Saddle-mounted for easy installation on lines in place. The meter in upper right illustration is saddle-mounted on a vertical pipe.

Bulletin 308 comes at your request.

J. W. SPARLING *Manufacturer of Water Measuring Equipment*

LOS ANGELES 54.....Box 3277 Terminal Annex
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The Perfected Method for Making SEWER PIPE JOINTS OF CEMENT

- No jute used—gasket centers spigot.
- Definite space in each joint for cement.
- Form confines cement-grout to lower portion of joint.
- Particularly advantageous in water-bearing trenches.
- Infiltration minimized.

L. A. WESTON **Adams, Mass.**

Economical-Effective Durable

SERVICISED
SEWER PIPE JOINTING
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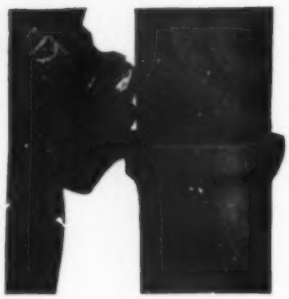

HOT POURED COMPOUND

Servicised Sewer Pipe Jointing Materials have served in the sewerage field through many years.

Our Hot Poured Compound is specially prepared for vitrified clay pipe used in sanitary sewerages.

Servicised Hot Poured Compound is quick setting and produces tough, flexible, long lasting joint connections. This material is shipped in Fiber Drum Containers that open very easily.

TUFFLEX . . . is a cold premixed troweling plastic material that is also widely used in jointing of vitrified clay pipe.

TUFFLEX is especially outstanding for use in wet trenches because the material will set under water, thereby assuring continuous pipe jointing.

The adhesive and cohesive qualities of this excellent compound are resultful in a highly waterproof and root repelling product.

Save time and labor cost by speeding up sewer pipe jointing with TUFFLEX. This material arrives on the job for immediate use.

Millions of pounds of Servicised Sewer Pipe Jointing Materials have been used throughout the country on Federal and Municipal Projects.

Pioneers in the Manufacture of Approved Construction Materials for Over 23 Years

SAMPLES AND DESCRIPTIVE LITERATURE WILL BE SENT UPON REQUEST

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6051 West 65th Street, Chicago, Ill.

84" pipe—Spring Lake, N. J.

FLANGED PIPE

FLEXIBLE JOINT PIPE

BELL & SPIGOT PIPE

SPECIAL CASTINGS

SHORT BODY BELL & SPIGOT SPECIALS

Large stock enables us to make prompt shipments.

CAST IRON PIPE

SIZES 2" TO 84"

Warren Foundry & Pipe Corp.

11 Broadway, New York

Warren Pipe Company of Mass., Inc.

75 Federal St., Boston

his position as chief engineer to become assistant sales manager of the Limitorque Div.; William F. Plume became chief engineer, and Robert E. Richards was appointed assistant chief engineer. All have been associated with Philadelphia Gear Works for some time.

LITERATURE AND CATALOGS

"Modern pH and Chlorine Control" from W. A. Taylor & Co. is a completely revised 83 page combination handbook and catalog (6th edition) on a subject of interest to every water, sewage and industrial plant engineer. Nearly two-thirds of the book are devoted to (1) a simple, non-technical explanation of the meaning of pH control and the methods for making colorimetric determinations; (2) precautions to be observed; (3) discussion of application of pH and chlorine control to a large number of fields including water purification, softening, sewage disposal, and boiler water treatment; (4) a technical discussion of the meaning of pH control. The remainder of the book contains descriptions of the Taylor, and Taylor-Enslow Slide Comparators for general pH and chlorine control, the determination of phosphates and the analysis of water for nitrites, nitrates, silica, iron, ammonia, etc. A copy of this useful book will be sent free on request to W. A. Taylor and Co., 7300 York Road, Baltimore 4, Md.

Inertol Protective Coatings for concrete and masonry surfaces and for iron, steel and wood surfaces are described in a four page folder of the Inertol Co. of Newark, N. J. Twenty-three different protective coatings are presented, with an index showing which products should be used on various structures such as bridges, dams, tunnels, filter basins, pipe lines, sewage tanks, sewage plants, and some forty other locations. On page four of the folder is a table showing, for each product, how to apply, number of coats required, drying time per coat, coverage, primer to use, and suitable thinner. This interesting and informative booklet on surface coatings of protective nature may be had for the asking, from the Inertol Co., Inc., 470 Frelinghuysen Ave., Newark, N. J.

Zeolite Water Softeners are presented in a recent bulletin by the Graver Tank & Mfg. Co. of East Chicago, Ind. Manual, semi-automatic and full automatic systems are shown, described and discussed. The bulletin contains sections on the underdrain system, the brine system, operating cycles, plant supervision, selection of manual versus automatic equipment, selection of standard versus high capacity zeolite, valve nests, automatic controls, tables of chemical and mathematical data, and a monogram showing the inter-relation between softening flow velocities, amounts of softening flows, and required zeolite bed areas, as well as the inter-relation between amounts of softening flow, minimum required capacities of various zeolites and raw water hardness. Typical plant layouts are also shown. This bulletin on Graver Zeolite Water Softeners may be obtained from the Graver Tank & Mfg. Co., East Chicago, Ind.

Fourteen Ways to Make Rope Last Longer are presented in a folder prepared by the Rope Conservation Campaign Committee approved by the War Production Board. Included among these fourteen practical ways to make rope last longer are recommendations on how to remove rope from coils and how to store, clean and dry rope. Warnings to avoid kinks, overload and sharp angles are given. Explanations are included for splicing rope, on why rope guys should be slacked off, why rope ends should be reversed, why abrasion should be guarded against, and why ropes should not be lubricated. How to splice a rope and save it is shown in six figures with directions. This helpful folder may be obtained from the Rope Conservation Campaign, Room 2303, 350 Madison Ave., New York, N. Y.

Yeomans Centrifugal Sewage and Trash Pumps are presented in Bull. 6201 of the Yeomans Brothers Co. of Chicago. All dry-pit sewage pumps manufactured by the company for municipal and industrial use are shown. Also presented for the first time in one 32-page book are data, description and detail on the whole long established Yeomans line of pumps. Included are new selection tables, new installation drawings and photographs, as well as specifications. Bull. 6201 is available to anyone who requests it from the Yeomans Brothers Co., 1433 Dayton St., Chicago, Ill.

FULL PRODUCTION *for* **WATER WORKS**

● We have never relaxed our efforts to supply whatever is needed for your services

therefore,

We manufacture everything in our line that is authorized by WPB Regulations

FULL PRODUCTION *for* **UNCLE SAM**

● Our facilities are being used to produce specialized items for the Army, Navy, and Air Corps

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This is in addition to our regular line that is urgently needed in the War Effort

We are proud of our achievement in doing both jobs

HAYS MANUFACTURING CO · ERIE · PA.

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(SINCE 1869)

★ Invest in Bonds today to provide for extensions tomorrow ★ ★ ★

PEACE *WILL* COME

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And you undoubtedly are now considering equipment for your POST WAR PROJECT.

As the *final* test of merit, we invite you to "ask the man who uses RENSSELAER."

Write for Bulletins X and W giving complete data on Valves and Hydrants.

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RENSSELAER VALVE CO.

TROY, N. Y.

ADVANTAGES of Positive Displacement

Roots-Connersville Aerating Blowers, for water and sewage treatment, have the lowest power consumption per cubic foot of air delivered at moderate pressures. Noted for exceptionally long life and ability to carry emergency loads in excess of rated capacities.

Twin impellers alternately suck in, momentarily entrap, and then expel definitely measured amounts of air, resulting in the delivery of four equal pre-determined volumes each revolution of the drive shaft. Impellers need no seal or lubrication. Capacity varies with speed. Pressure automatically builds up to overcome resistance on discharge side.

Write for Bulletin today, and be prepared to make the *best* selection as soon as war-time restrictions moderate.

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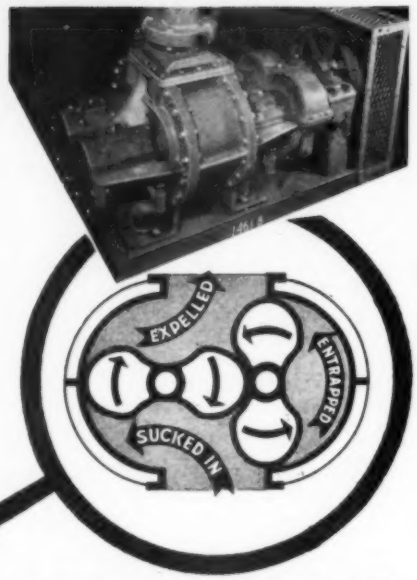
402 Mount Ave., Connersville, Ind.



Above photo shows "R_C" Blower used in water treatment process. Capacity 300 c.f.m., 640 r.p.m., 5 lbs. pressure.

Roots CONNERSVILLE SINCE 1854 Aerating BLOWERS

★ THE NATIONAL METHOD • OVER 35 YEARS EXPERIENCE ★

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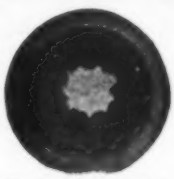
MANY cities that now find their water supply resources sadly overtaxed by the additional thousands of water users in defense industries and nearby army training camps, are turning to the *NATIONAL METHOD of water main cleaning* as an economical means of improving water service.

Cleaning by THE NATIONAL METHOD restores clogged mains to at least 95% of their original carrying capacity, making unnecessary large expenditures for auxiliary pipe lines, increased power at the pumps, new standpipes, etc.



Before Cleaning

After Cleaning

The NATIONAL METHOD

GUARANTEED TO RESTORE 95% ORIGINAL CAPACITY

The National Water Main Cleaning Co.
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205 W. Wacker Dr., Chicago, Ill.
501 Howard St., San Francisco, Calif.
2028 Union Ave., Montreal, Can.

Talk-A-Phone presents complete intercommunicating systems in Catalog 1944 of the Talk-A-Phone Mfg. Co., Chicago. Fifteen different models of intercommunication are described, including the new C-410 Coordinator using the new improved "Hold-A-Matic" push button switch. These intercommunicating systems are time and step savers in any plant where it is desirable for the administrative office to contact men in the plant. Catalog 1944 may be obtained from the Talk-A-Phone Mfg. Co., 1219 W. Van Buren St., Chicago, Ill.

Bulletin 2200 of the Cement Gun Co., Allentown, Pa., contains some interesting information and pictures on the use of "Gunite" for tunnels and sewers, irrigation ditches, swimming pools, water reservoirs, steel encasement, and concrete repair to dams and other structures. Also included in the bulletin are specifications and technical data. Bulletin 2200 may be obtained from the Cement Gun Co., Allentown, Pa.

"Michigan" Water Pipe is presented in a booklet devoted to this Combination Steel and Wood Pipe. The brochure gives in concise manner facts that are of interest to construction engineers, superintendents, engineers of water works or others having liquids to convey. The merits of wood pipe are fully presented with historical data extending back some 300 years.

The booklet also contains tables on water supply and other technical data, as well as descriptions of how the pipe is made, features of the pipe, specifications, and reasons for its use. There are sections on installations, fittings, and pipe for mines, tanneries, hatcheries, paper mills, and chemical plants. Over 100,000 miles of this pipe are in use, some for over 47 years. Sizes up to 48 inches are made regularly.

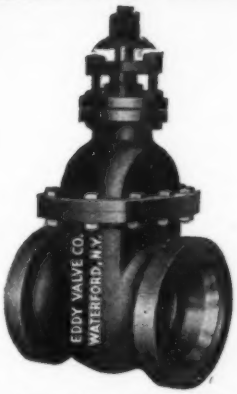
This interesting booklet on "Michigan" Wooden Water Pipe may be obtained from The Michigan Pipe Co., Bay City, Mich.

Schramm Hose Reels are pictured and described in a single sheet, Bull. HR-43, of Schramm, Inc., of West Chester, Pa. Available in all types of mountings on compressors in shops and on trucks, these hose reels have several exclusive features, including easy mounting, built-in valve construction, sturdy construction, self sealing and easy turning. A table giving the dimensions of reels with straight sides or for convex head tanks is given. Bull. HR-43 may be obtained from Schramm, Inc., West Chester, Pa.

EDDY

FIRE HYDRANTS AND VALVES—

WATER WORKS EQUIPMENT



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For
Water Works
and
Sewage Disposal
Plants

EDDY FIRE HYDRANTS
For Fire Protection Service

Write for Complete Catalog

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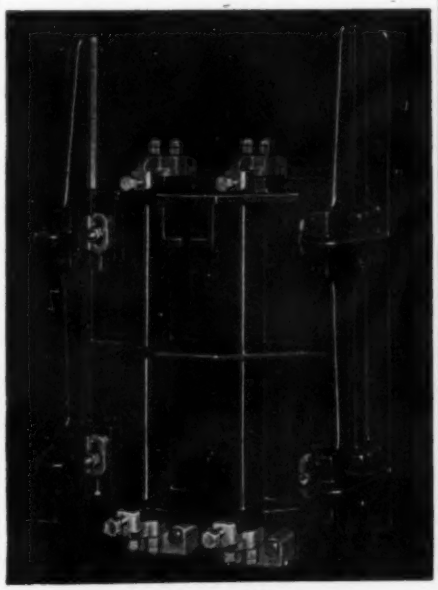
VALVE COMPANY
WATERFORD, N. Y.

"Industrial Wastes Guides" is the U. S. Public Health Service Supplement "D" to Final Report on the Ohio River Pollution Survey. Information on industrial wastes available in the literature has been added to information obtained during the survey to produce a needed and useful reference work on the subject. Prepared originally in preliminary form to instruct the field engineers engaged in the survey and to serve as a basis for determining remedial measures in connection with the report, the "Guides" have been unusually well received, a development which led to their being incorporated as a supplement to the Final Report.

Eleven Guides are included, each dealing with a specific industry as follows: Brewery, cannery, coal washery, coke, cotton, distillery, meat, milk, oil, paper, and tannery.

The chief value of the Supplement is not so much in the new information presented, although this is appreciable, as in the gathering of existing information in one place. Stress has been placed on the interrelationships in the various industries between raw materials, products, employes, water consumption, and strength and quantity of wastes. This information makes possible



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Distinguished by precision workmanship

If you haven't seen a National Sluice Gate you can't appreciate its unusual combination of giant strength and velvet-smooth operation. Finest materials, ample sizing, painstaking workmanship and assembly assure you of a gate which really shoulders the load. Send for descriptive literature.

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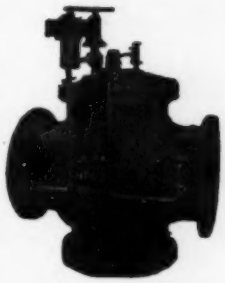
Control of elevation and heads into and out of tanks, basins and reservoirs.
1. Single acting.
2. Double acting.
3. Combination assembly for three or more automatic operations.

COMBINATION VALVE
Combination automatic control both directions through the valve.
A self-contained unit, with three or more automatic controls.



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Electric remote control—solenoid or motor can be furnished.
Adapted for use as primary or secondary control on any of the hydraulically controlled or operated valves.

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Whether your problem of water rectification is large or small, we have a form of equipment to serve your needs. We manufacture and install equipment for Gravity Filtration and Softening Plants; Pressure Filters and Zeolite Softeners; Swimming Pool Recirculating Appliances; and Water Treatment Units of all types.

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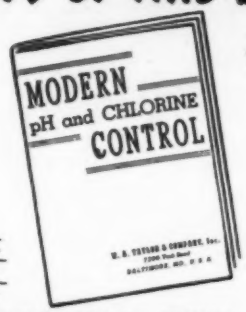
preparation of at least approximate estimates of the magnitude of industrial pollution from available information on the magnitude of the industry. Corrective measures within the industrial plant are stressed. Effectiveness of various treatment processes is discussed and cost figures are given when found reliable.

For a copy of "Industrial Wastes Guides" address the U. S. P. H. S., Office of Stream Sanitation, Cincinnati, Ohio.

Earle Gears, as manufactured by the Earle Gear and Machine Co. of Philadelphia, are presented in a bulletin of that company. Views of the variety of Earle Gear products, including spur gears, bevel gears, helical gears, worm gears, non-metallic gears, racks, sprockets, sheaves, and special gear machinery are also given. If interested in gears this should not be overlooked and may be obtained from The Earle Gear and Machine Co., 4707-17 Stenton Ave., Philadelphia, Pa.

Wartime Care of Chain Belt Drives, Bull. No. 435 of the Chain Belt Co. of Milwaukee, is a booklet containing information on maintenance, lubrication and repair of chain belt drives during these war-

A COPY OF THIS BOOK



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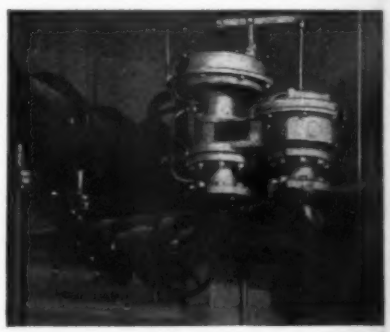

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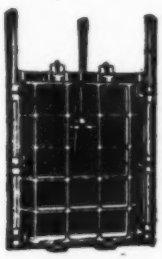

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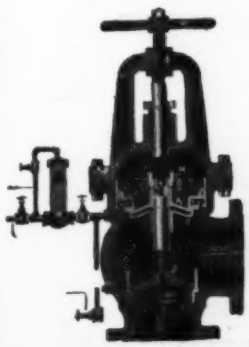

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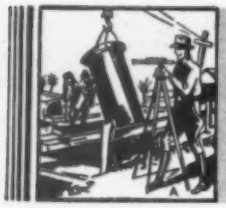

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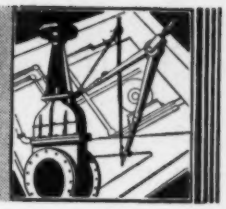

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Servicised Products Corp.	80
Simplex Valve & Meter Co.	26
Sirrine & Company, J. E.	99
Smith Mfg. Co., The A. P.	85
*Sparling, R. W.	89
Stanley Engineering Company	99
Star Electric Motor Co.	15
*Stuart-Brumley Corp.	89
*Tate Pipe Linings, Inc.	95
Taylor & Co., W. A.	94
*Tennessee Corporation	86
Thomson Meter Company	32
U. S. Pipe & Fdry. Co.	13
Victualic Co. of America	25
Vogt Brothers Manufacturing Co.	96
Vogt Manufacturing Co.	96
*Wallace & Tiernan Co., Inc.	Back Cover
Warren Foundry & Pipe Corp.	90
Westcott & Mapes, Inc.	99
Weston, L. A.	89
Weston and Sampson	99
Whitman and Howard	99
Whitman, Requart & Smith	99
*Wilson Chemical Feeders, Inc.	86
Wood Company, R. D.	82
Yeoman Bros. Co.	29
Zeolite Chemical Co.	85

*Advertisers with * were represented in the June, 1943, Convention and Data Edition with catalog specification copy. Please refer to that issue for additional information on behalf of their products.

MEMO TO: ALL SANITARY ENGINEERS

SUBJECT: DORRCO VACUATOR DATA

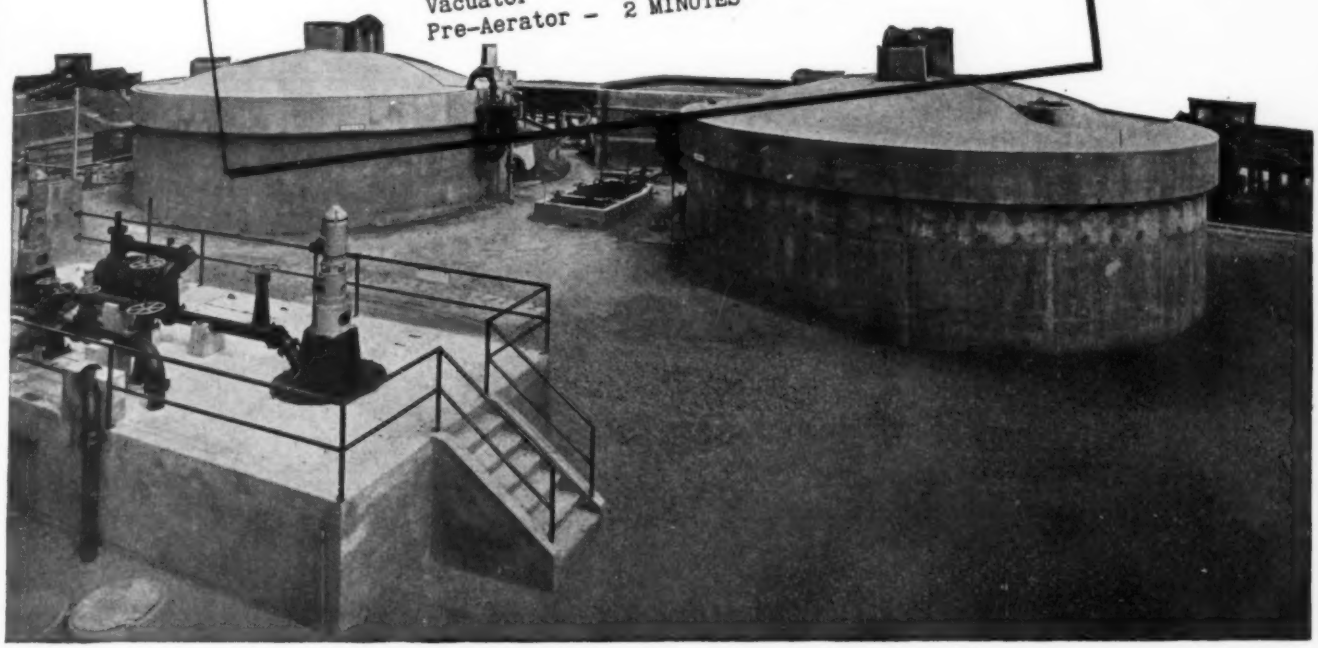
Here are average results from a Dorrco Vacuator installation which you should find interesting. They were compiled from 24 hour composite samples.

REMOVALS	Raw Sewage	Vacuator Eff.	% Reduction
Susp. Solids (P.P.M.)	365	178	51.2
5 Day B.O.D. (P.P.M.)	329	233	29.1

OVERFLOW RATE – 4600 GAL./SQ. FT./24 HOURS

DETENTION PERIOD:

Vacuator 24 MINUTES (THEORETICAL)
Pre-Aerator – 2 MINUTES "



New in principle and remarkably efficient and economical in operation, the Dorrco Vacuator is the real answer to your problem of troublesome, light solids removal.

It operates at high overflow rates and low detention periods . . . will remove substantial quantities of grit . . . eliminates unsightly skimmers and odor nuisance...and as a pre-skimmer will improve the overall efficiency of your plant.

Write for the Dorrco Vacuator leaflet and further technical information on this new unit—or better still, call in a Dorr Engineer to explain its value to you in person.

DORRCO

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ADDRESS ALL INQUIRIES TO OUR NEAREST OFFICE

"SAFETY-PLUS"

throughout your post-war water system

TOMORROW'S STANDARDS for water quality are sure to be higher. Health officials will want extra safety *and then some* throughout the distribution system. And your community will want taste-free palatability *every* day of the year.

TO BE READY to meet these standards, better start your planning now, so that you will be out of the blueprint stage when the chance for *action* comes.

RIGHT NOW you can secure information on the most advanced methods of chlorination from a forward-looking W&T Representative. Ask him to help you plan for *Safety-Plus.*

"The Only Safe Water is a Sterilized Water"

Keep your eye on these keys to post-war chlorination progress

BREAK-POINT . . . for greater health protection, plus taste and odor control.

DUPLICATE UNITS . . . for 100% safety-insurance, plus peak load reserve.

FULLY AUTOMATIC CONTROL of application, to maintain a definite residual.

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